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EDITORIAL NOTES.

According to advices published at page 25, the subterranean fresh water lakes and streams of Australia that have been tapped here and there are suitable for watering stock, but not for irrigation. Some of the bores in Queensland yield as much as 5,000,000 gallons per diem, the average being about 700,000 gallons per day, and it seems curious that such copious streams of water will cover only a circumscribed area, instead of carrying their life-giving mission far afield. If a few old river beds lay in the path of the escaping bore waters it would be easy to foresee a great change in this direction. Most of the Australian artesian bores have been put down in pastoral districts where the surface is a deep porous soil that absorbs the water very quickly and prevents its wider extension. The geological formation of many parts of Cape Colony are similar to the artesian portions of Australia, and if our farmers could get similar results they would, we think, be content with plenteous water for their stock and let irrigation go. But does it follow that because some Australian gentlemen have proved certain Australian artesian waters to be unsuitable for plants that all artesian water is equally deleterious ?

"I have now been in America nearly a week," writes the Cape Government's Chief Veterinary Surgeon on 28th November last. He had paid a visit to the great annual Horse Show of New York. The show consists mainly of riding and light driving horses with some team competitions of heavy draught horses and a few others, and is chiefly remarkable for its vast and fashionable audiences, banqueting, gaiety, and the fact that big gate money and general raking in of coins everywhere are indispensable conditions. When visiting the Bureau of Animal Industry at Washington Dr. Hutcheon was cordially welcomed by Dr. Salmon, Chief of the Bureau, and Dr. Schroeder, who is in charge of the Experimental Station. These officers of the Department were busily engaged on experiments. Dr. Salmon is endeavouring to prove that Koch's theory respecting the non-communicability of bovine tuberculosis to man is wrong, and, for upwards of ten years, he has been trying and is still trying to discover a vaccine for swine plague. Another eminent specialist, Dr. Styles, is busy with animal parasites, and is engaged upon a new book on ticks with numerous correct and beautifully executed illustrations. The Bureau has a huge work of reference in preparation for the press, to which, of course, all the experts and other clever persons contribute. Dr. Hassel is its editor and compiler as well as a contributor, and it will occupy five years, in addition to the ten years already absorbed, to complete the work. This is another instance of the fact that nothing is counted worth doing in America unless it is big and comprehensive. In his walks round the laboratories Dr. Hutcheon was impressed with the completeness of everything. Large quantities of tuberculin, anti-toxin and anti-tetanine and vaccines are prepared and kept in stock, and so is a rich and varied collection of all animal parasites. A touch of envy might almost be imagined in his description of the privileges enjoyed by the specialists. For instance, there is a splendidly organised staff of assistants who do all the merely routine work. The specialists themselves require to do nothing more than think and devise; then a button is touched or a bell sounded, and somebody is there in a twinkling to carry out the master-worker's ideas and instructions. Dr. Hutcheon goes from Washington to Baltimore and New York; thence to Chicago to attend the great International Stock Show and the Meeting of the

Stock Breeders' Association, and, returning to New York, leaves that city for Cape Town on 14th inst. He is certain to bring with him a store of useful information. His return to the Colony will be welcomed not only by the Agricultural Department but by the whole farming community.

We call special attention to the letter reproduced in this issue relative to the recent speech of Professor Wallace upon the agriculture of South Africa. It always puzzled us to account for the delivery of such an ultra speculative utterance from one who ought to know that agriculture in South Africa is yet in the swaddling clothes of infancy. He and others may say what they choose about agricultural methods as they stand, but when it comes to a forecast of the future that predicts sterility, or at best mediocrity, we look for data. We believe it used to be a rule of the Royal Colonial Institute that all papers that were likely to savour of prophecy and speculation should be submitted to a committee before delivery, and it is a pity that this one of Professor Wallace's escaped the scrutiny. We cannot think the Royal Colonial Institute knowingly sanctioned a paper so completely based upon visionary premises. There are absolutely no data for most of his deductions. How could it be otherwise, when his actual South African experience extends over a period of a few months on a "flying tour"?

Good news from the fruit growers in the Western Province, who are jubilant about their crops. The vineyards especially promise a record yield of grapes; apples, pears and plums are well to the front, while peaches and apricots are in most cases all that can be desired. The apricots, indeed, a very large crop, are practically harvested and dried ready for consumption. Growers are busily arranging to make early shipments. The first consignment goes home on the 2nd inst. It has been gathered chiefly in the Paarl and Wellington districts, and consists principally of plums of the Japanese section (Burbanks). We should not be surprised to see shippers' contracts for Europe largely increased owing to the difficulties that prevent the fruit reaching the up-country markets. And yet our seaport towns, that just now contain large numbers of visitors, can take a deal of fruit and pay good prices, and we dare say much of it will go there. The vignerons, too, are most cheerful about the forthcoming yield of grapes, which also promises to be a record one.

We reproduce with pleasure a notice of motion given by the Hon. Thos. Bailey at the meeting of the Queenstown Farmers' Association on 24th Nov. last, in support of a Bill to be submitted to Parliament enacting that sheep should be shorn only once a year. Apart from the suffering entailed on the unfortunate animals, the practice of shearing twice a year is economically false and destructive. No wonder the debilitated twice-shorn flocks are prone to every disease that seeks a prey among the farmer's stock.

COUNTRY REPORTS.

Brakfontein.

W. R. ELLIS, Nov. 30th :—Splendid rains have fallen during the month and ploughing extensively carried on. What wheat crop there is (comparatively none) promises most likely, and the same may be said of forage, which in some instances has been reaped. Rust is apparent in the latter, but up to the present not to any great extent, though I fear the few days of drizzling misty rain just experienced will not improve matters in this direction. The potato crop promises well, the same applying to pumpkins, beans, peas, &c. Garden produce is likewise well to the fore. The earlier mealies and Kaffir corn good, and generally speaking the outlook for the agriculturist is most cheering. No locusts in the vicinity, and we shall be fortunate to escape a visitation of those which are now overrunning Alice, Queenstown, &c. Having had our innings we can well dispense with any further part in the locust game. As to fruit, the early or November peach is now on, the trees yielding well. Apples somewhat backward. Stock in good condition, fairly free from disease, and pasturage and water abundant.

Christmas Vale.

E. W. HOLDSTOCK, Dec. 2nd :—I have the honour to report that the prospects of the month are better than last month. A considerable quantity of oat hay has been harvested during the month from Egyptian seed. The late crops of oats are showing rust. Mealies have been sown during the month. Hail stones on the 19th did damage to fruit gardens. Veld splendid. Four cases of sponsziekte and one of meltziekte during the month. Otherwise stock in good condition.

East London.

V. E. BRADSHAW, A.R.M., Dec. 17th :—Since my last report light rains have fallen in different parts of the District almost weekly, and crops of all kinds were promising well. The prospect has, however, somewhat darkened by the arrival of large swarms of red winged locusts from the North East, which are playing havoc with the crops all over the District. Owing to the absence of gales they (the locusts) are not moving about in any definite direction, but have settled down to the work of destruction. The farmers are consequently much disheartened at this damper on their hopes of a good harvest. Stock of all kinds in good condition. There have been a few cases of anthrax, lung-sickness and sponsziekte, against which measures were at once taken to prevent further infection.

Kokstad.

A. Rein, A.R.M., Dec. 4th :—I have nothing to add to my report for October. The agricultural outlook continues to be very favourable, the weather during the last month having been most seasonable. Lung-sickness has again appeared on a farm close to Kokstad which had only recently been released from quarantine. A case or two of the disease have also occurred within the township. The usual steps have been taken. The pasturage throughout the District is in splendid condition.

Maclear.

J. Simpson, A.R.M., Nov. 30th :—There is very little to report this month. Seasonable rains have fallen and the weather has been favourable to the growing crops, which I understand are looking well—forage crops especially. From all sides I hear that the lambing season has been a very favourable one, and that both large and small stock are doing well.

Matatiele.

W. Bellairs, R.M., Dec. 12th :—I am glad to be able to report that rinderpest has now disappeared from this district, and that with the exception of a few cases of lung-sickness stock of all kinds are healthy and in excellent condition. Rains continue to be copious, and the season gives every hope of a rich and splendid harvest of all kinds of crops.

Mount Ayliff.

R. L. Harries, R.M., Dec. 5th :—Plenteous rains have fallen and the growing crops look well; this promises to be an exceptionally good year for cereals. The pasturage is very good. There is still some lungsickness in a quarantined area, but it is not now spreading.

Mount Fletcher.

J. C. Hargreaves, R.M., Nov. :—Nothing of any importance has occurred during the past month. Splendid rains have fallen and the veldt in consequence is very good. Stock of all kinds are in good condition. Lung-sickness continues to make its appearance every now and then. Rinderpest has entirely disappeared. No locusts have as yet visited this district.

Mount Frere.

H. B. GARNER, A.R.M., Dec. 4th:—Plentiful rains fell during the past month, and gardens are looking well. With a few exceptions, all ploughing is complete and more land than usual has been put under cultivation. No rinderpest has as yet broken out in this district, but lung-sickness still exists, owing, I am sorry to say, to disinterested speculators introducing infected animals into the district, and exchanging same for horses. Although warned, the natives cannot resist the temptation of possessing a few head of cattle, and in almost every case the disease breaks out only a few days after the newly possessed animals reach home. All other stock are in first class condition, and the veldt is all that could be desired.

Qumbu.

E. RUSSELL, A.R.M., Nov. 30th:—Within the past month there have been good gentle rains almost daily, with occasional thunderstorms. The pasturage could not be better than it is at present. The crops are looking well, and the present outlook for a good harvest is more hopeful than it was at this time last year. Stock on the whole are healthy and looking well. Lung-sickness appears to be the only prevailing disease in cattle, and this is, I am glad to say, in marked decrease. Rinderpest is no longer heard of.

Shelford, Ward 3. (East London.)

THOS. WILLOWS, F.C., Dec. 4th:—The early oathay crop is excellent and the later sowings are promising well. Unfortunately very little wheat was sown owing to its liability to take rust, but there is no indication of it so far, and the crops, although small, will most likely induce farmers to make another trial next season. Slight rains have fallen but not in sufficient quantities to make water, and it has already been remarked that the hard soil is too dry for the plough. The veld is good and stock thriving well.

Tsolo.

H. H. BUNN, A.R.M., Dec. 9th:—Splendid rains have fallen during the month and excellent crops should be reaped if hail and locusts do not destroy them. At the Jenca mealies and Kaffir corn are already in flower, and there is at present every prospect of an excellent harvest.

Umzimkulu.

CAPT. E. J. WHINDUS, R.M., Dec. 2nd:—The splendid spring weather continues, rainy days alternating with bright warm weather; the total rainfall for the month is 3.60. Ploughing has been carried on extensively all over the District. The work of shearing has been somewhat retarded owing to most of the farmers being away on active service with the East Griqualand Field Force. The Natal Government prohibited the introduction of cattle across the Natal—East Griqualand border recently, fearing rinderpest. This step greatly restricted wagon traffic and almost blocked the transport by farmers of the season's wool to Natal. I am glad to report the prohibition will be removed on the 3rd instant. There is no disease amongst stock and all animals are in good condition.

Warrendale. (East London.)

F. H. WARREN, J.P., Dec. 2nd :—The country is green and water is no longer scarce. Stock are doing fairly well except that there are a few cases of sponsziekte among cattle. Growing crops are looking well, but there are complaints about grub in mealies and some kind of insect in the Kaffir corn. My advice is to pile up and burn any grub-infected mealies to be found in the crop. It prevents the spread ofgrub. The insect in Kaffir corn I know nothing about; it is new to me. Ploughing and planting are still proceeding. Farm labour is scarce.

AGRICULTURE.

Professor Wallace and Agricultural Prospects in South Africa.

With reference to an enquiry as to the merits of a paper read by Professor Robert Wallace at a meeting of the Royal Colonial Institute on 12th March last, the following extracts from a reply communicated by direction of the Secretary of Agriculture are reproduced as being of general interest :—

OSTRICH FARMING.

Professor Wallace apparently grudgingly admits the profitable character of ostrich farming, but hastens to add that it is very speculative; carefully picking out two or three years which show to best advantage the variation between the weight and the declared value of the feathers.

The following table for the last 14 years, 1886-1899, shows a difference in value from time to time which does not exceed an ordinary market variation, and which can certainly not be quoted in showing that ostrich farming is a merely speculative business. The dictates of fashion may be capricious, but they do not go beyond deciding whether feathers shall be worn in the hat or round the neck. The ordinary instinct of feminine humanity is too strong to allow of them being dispensed with altogether.

EXPORTS OF OSTRICH FEATHERS.

	No. of Birds.	Lbs.	Value £	Rate per lb.
1886	—	288,568	546,230	£1 17 10
1887	—	268,832	365,587	1 7 2
1888	152,415	259,967	347,792	1 6 4
1889	149,684	229,137	365,884	1 11 11
1890	114,411	212,276	563,948	2 12 7
1891	154,880	198,046	468,221	2 7 3
1892	—	257,102	517,059	2 0 2
1893	232,243	259,933	461,552	1 15 6
1894	240,191	350,404	477,414	1 10 1
1895	253,468	353,651	527,782	1 9 10
1896	224,953	322,453	519,539	1 12 2
1897	231,632	355,196	605,058	1 14 0
1898	267,693	369,778	748,565	2 0 5
1899	260,672	373,182	842,000	2 9 11

As a matter of fact ostrich farming was at its first inception highly speculative owing to want of knowledge and experience, but for the last fifteen years it has been a fairly stable and highly successful industry.

SHEEP AND GOATS.

Professor Wallace says that "as compared with other colonies "the number of sheep and the average holdings are comparatively "small, due in a great measure in the Karroo to the large area "required for grazing"—but he adds—"nevertheless in the "grassy districts of King William's Town, Bedford and Somerset "East holdings of 5,000 to 10,000 sheep are to be found."

Despite this qualification the impression is left on the mind that the pasturage is not rich enough to carry an average number of sheep. Since, however, the above extract was evidently taken from Mr. Wilhelm Spilhaus' paper in Noble's Official Handbook (Cape Town 1893, Chap. XIV. p. 311) it is a pity that he did not continue the quotation as follows:— "*But further to East and "North the younger Districts have left their older neighbours far "behind.*"

As a matter of fact while the districts Professor Wallace mentions carry from 30 to 120 sheep per square mile, the districts he does not mention carry from 150 to 350 sheep per square mile. These are known as the grass districts, comprising Fort Beaufort, Stockenstroom, Cathcart, Tarka, Stutterheim, Queenstown, King William's

Town, Aliwal North, Barkly East, Wodehouse, and the Transkeian and Tembuland Territories, and compare very favourably with the Western slopes of New South Wales and the Riverina District.

Professor Wallace was perfectly justified in stating that what were formerly excellent sheep districts such as East London and Victoria East had been rendered unhealthy for small stock owing to the extension of the area affected by "Heart-water" and to the increase of the blood-sucking tick, though it may be observed that he emphasises his statement with a free use of dismal adjectives.

Recent experiments have shown that the one scourge, the tick, is the cause of the other, the disease, and Professor Wallace and others will be glad to hear that the trend of their experiments lead to the hope that the tick after a lapse of time becomes non-pathogenic, as sheep lately introduced into this district have been found to live and thrive unaffected; and, further, that an effectual means of combating the disease will be found in inoculation with an attenuated form of the poison.

It would unfortunately be impossible for even Professor Wallace to speak in too pessimistic a strain of the injury done to the flocks by scab; and until the statute law be amended by provisions placing the appointment of sheep inspectors solely in the hands of the Government, and the farming community or the bulk of it can be induced to accept more stringent regulations than the present, it is impossible to hope that measures can be taken which will successfully eradicate this scourge.

Angora goat farming is not only the increasing and prosperous industry described by Professor Wallace, but, as he might have stated, the production of mohair *has steadily increased in 26 years from 1 to 12 million pounds per annum*, and the total annual production is now greater than that of any other country in the world, exceeding even Turkey by over 25 per cent.

Undoubtedly the Americans are developing this industry with the intelligence, business acumen and success which they bring to bear on everything they attempt, and in the future their production will probably exceed that of this Colony, but at this date when their total output is only 1/17th of that of the Cape, it seems premature to speak of them as our "chief competitors next to the Ottoman Empire."

What may reasonably be said of this industry is, that although in the lower grades of hair we surpass Turkey, in quality and weight of hair we have not yet succeeded in equalling her finest quality; and, further, that although the United States are a long way behind us both in the total output and in the quality of her goats, yet unless we emulate her energy and activity and take prompt steps to protect ourselves, we shall see the ball kicked away from our feet.

HORSES.

All that Professor Wallace can tell the Fellows of the Royal Colonial Institute of horse breeding in the Colony is that horse sickness checks the progress of this branch of stock rearing. His statement may be supplemented thus from his own work, "The Farming Industry of Cape Colony," page 319:—"There is little "doubt that mule breeding, as well as horse breeding, if conducted "on successful principles and managed skilfully, has a great future "before it in South Africa, the animals bred being not only for use "in the Colony and up-country, but for export to India and other "parts of the world for army purposes."

Recent events have shown that Professor Wallace by no means over-estimated the case in 1895. One of the great lessons of the war was to show the value of the South African horse, and it is not too much to say that without the aid of the Colonial horse the military difficulties would have been increased. If the Boers had not been so excellently mounted as they were on horses bred in the Transvaal, Orange Free State and Cape Colony, the war would have worn a different aspect.

In connection with this subject I would invite attention to an article in *The Field* of 18th May last, in which it is pointed out that for South Africa the horse of the country is best suited to the needs of mounted troops quartered there, with the exception of artillery. The South African horse can live on much less food than an English horse, he does not suffer from the climate, he does not tumble into holes, he is sounder, he is more sensible, and learns to stand alone without being tied up better. His wind is almost invariably clean and free from disease. "Those who said before the great war that there were no remounts available for cavalry in South Africa must have been surprised at the endless supply obtainable by the Boers and ourselves as well."

CATTLE.

Professor Wallace mentions "certain districts of the coast country where the veld is comparatively sweet" and "where the best transport cattle reared in the Colony are bred." As a matter of fact most of this veld is "zuur" or sour and not sweet, but none the less suitable on that account for cattle grazing; but passing that over it is curious to notice that beyond a few remarks on the comparative merits of some English and Indian breeds for importation purposes and a characteristically impressive account of the "recent and disastrous visitation of rinderpest," this is all he says of stock breeding in the Cape Colony.

Nobody would realise that the Colony possesses a vast area north of the Orange River in extent about 51,000 square miles, which is better adapted for cattle rearing than any other portion of the Colony, *and promises to be one of the finest cattle countries of the world.*

The same, it is believed, may be said of the Transvaal high veld, which Professor Wallace described as too cold in winter and too much infested with ticks in summer. This statement was disputed at the reading of his paper by Mr. Loveday. "Dairying is steadily developing." Beyond this bald statement no reference whatever is made to the Dairy Industry, an industry which only recently has become of importance, but which is one of the greatest promise, and would, except for rinderpest, have already reached considerable dimensions.

The number of Co-operative Creameries is rapidly increasing.

FRUIT.

Professor Wallace has much to say on the Farming Industries, on Fruit Growing and Marketing, to which he devotes two chapters. At the date at which he wrote, the attention of South African agriculturists had only lately been directed to this branch of agriculture, but even the orchards he visited he describes as giving "splendid results," and two well-known shippers whom he names were sending home fruit "much sought after by retail buyers in London."

Yet in the present paper, beyond the statement that water boring is useful for the growth of fruit, and that the Eastern Coast Districts are well adapted for fruit growing of all kinds, especially citrus and other tropical fruits, he makes no reference to this industry.

At present it may be regarded as only in its infancy, and many producers who have recently turned their attention to it have yet to gather the first crop from their newly created orchards. As it is, however, they are able to cope with the growing demand of such home markets as Kimberley, Johannesburg and Bulawayo. The development of these centres and the establishment of fresh ones will nevertheless increase the local demand until it far exceeds the present supply.

On the other hand, we have fresh fruit and vine districts opened up by railway extension, and, in view of the advantages the Cape has over other fruit-growing countries in its geographical position and its climatic conditions,—the one placing it more favourably than Australia, and the other permitting it to supply when the countries of the northern hemisphere are in their winter season,—the shipment of fruit abroad may confidently be expected to develop, *pari passu*, and take an increasingly prominent place among our exports.

The rapidly increasing volume of fruit exports is shown by the following figures :—

1897-98	9,169 cases.
1898-99	10,817 „
1899-00	17,536 „

Professor Wallace can therefore scarcely justify his almost total disregard of this subject in a paper which purposes to discuss the agricultural prospects of South Africa.

The same remarks are equally applicable in the case of Viticulture, of which he states in his "Farming Industries" :—"The least of the average figures printed (showing the annual yield of wine) are a long way more than double the corresponding figures in any or all of the wine-growing districts of Europe, which gives the Colonial farmer an immense initial advantage." He adds: "It only remains now for him to improve the methods." To which it may be said that methods are improved, and the Cape can and does produce a good, sound, wholesome and palatable wine which at present finds a ready sale in the Colony and leaves no surplus for exportation. The supply here is much under the demand, and wine-making therefore affords excellent prospects.

FOREST AREAS.

Professor Wallace when in South Africa failed to make himself acquainted with the forest question here, not even visiting the Forest Office in Cape Town, nor seeing the work done in this neighbourhood.

Naturally in his reference to Forest Areas in his paper he shows a want of grasp of the subject. So far from the influence of trees to attract rainfall being acknowledged, it is a much controverted point, the best meteorological opinion of modern times being disposed to deny it. He appears ignorant of the fact that the Colony has spent about £50,000 yearly, not on account of a controverted meteorological point *but to save and produce within the country the quarter of a million pounds sterling paid yearly for imported wood.*

For this purpose the Colony has a forest organization and is doing forest work which is unequalled in any British Colony.

Professor Wallace did not visit the pine plantations on which he is pleased to call the worthless Cape Flats, which are the largest and most successful in the Southern Hemisphere; nor is he apparently aware that the capabilities of the country are such that a quantity of coniferous wood could, by the cheap process of broadcast sowing, be produced sufficient to render South Africa an exporting timber country.

CEREAL CROPS.

His remarks as to the area of cultivation of cereals in the Cape Colony are also misleading, as he refers only to the districts of Malmesbury, Piquetberg, Caledon and Calvinia. He omits to note that some of the finest grain-growing districts are Aliwal North, Herschel, Barkly East, which are an extent of the conquered territory, and Basutoland, which last he elsewhere calls the granary of South Africa. Here only easy access to a market is required to throw areas of land under cultivation of wheat, rye and oats.

LUCERNE.

Professor Wallace merely refers to lucerne as used to feed ostriches in the Oudtshoorn District. He seems unaware that its cultivation is carried on with most satisfactory results throughout that large area of the Colony which enjoys a rainfall of from 20 to 40 inches, especially in those districts which are less suitable for wheat and other cereals. It furnishes from four to six crops in summer and from one to two crops in winter, *and is practically revoultionising farms in this naturally fertile region.*

RAINFALL, WATER SUPPLY, IRRIGATION.

It is significant, as indicating Professor Wallace's mental position in this matter, that when discussing the subject of rainfall, he deliberately excludes all reference to the whole of the large and fertile area just referred to where dry cultivation or cultivation without irrigation is carried on with such conspicuous success, and one would not gather from his remarks that the greater part of the Colony possessed an annual rainfall of from 20 to 40 inches.

Further, the fifteen or twenty inches of fairly certain winter rainfall such as we have over a large area in the Western Districts is enough for the winter grain crops, being effectively worth double the rainfall under the hot summer sun; *this moderate but steady, and therefore valuable, western winter rainfall is ignored by Professor Wallace.*

He contents himself with mentioning that the area of maximum mean annual rainfall of over 54 inches is confined "to the spurs of the Drakensberg and a narrow belt between them and the East Coast," and then passes on to remark that the "north-west corner of the Cape Colony and the western half of the great area under consideration is little better than a desert," and deduces therefrom the general deficiency of rainfall.

Again Professor Wallace shows his pessimistic bias in his remarks on the farmers' dams scattered about the country, which he describes as "shallow dams constructed in all directions in which the thunder rains collect and into which cattle are permitted to walk at will while they drink." "These dams," he continues, "are veritable cesspools and a fruitful source of disease among the British troops during the past 18 months." It was not previously known that the outbreak of enteric at Paardeberg and Bloemfontein was caused by farmers' dams, and, unless the Professor has in his mind what would be called a "horsepond" in his country, it may be very much doubted whether any one of the farmers' dams can be correctly likened to a cesspool unless on the few occasions when a column or commando passed over the farm. That they easily dry up by evaporation may be conceded.

It should be remembered that they are cheaply and rudely constructed fro mmaterials at hand by unskilled workmen; they are such small dams, it may be said, that have fed from time immemorial the bulk of the population of India, and not great canal systems which pay but a small percentage on their cost and are subject to the difficulties of seepage and risk incurred at Van Wyk's Vley. Elsewhere Professor Wallace points out that not moisture but drought is a serious deterrent to the increase of livestock, but I have already referred to the erroneous conclusion as to the quantity of rainfall which can be deduced from these too partial remarks on the subject. Certainly as in Australia, prolonged droughts have at times been very calamitous, but the increased cultivation of lucerne to which Mr. Munro refers in his comments on the paper, is greatly mitigating this evil. Moreover, throughout that great area of 20-40 inch rainfall so unaccountably ignored by Professor Wallace, water-boring has been of much service for watering stock, and for horticulture, and although depths of from 20 to 100 feet are the usual levels at which water is struck, and we do not consequently meet with the immense volume of water which agriculture on a large scale would require, and which can only be expected from artesian well-boring at great depths, it may be said that artesian well-boring has yet to be tried in this Colony systematically.

While Mr. Wallace states in one part of his paper that, owing to the mountains not reaching the perpetual snow-line and there being consequently no summer reserve of snow, large undertakings like those of the great canal system in India are not possible, he admits in another place that these same mountains lend themselves by their configuration in "a peculiarly favourable way" to the "formation of deep and capacious reservoirs," and he proceeds to describe some of these schemes.

Again, in one part he says that in the Cape Colony about 300,000 acres have been put under irrigation "on the whole with success," and that in one district containing rich lime-stone soils "the results would be difficult to surpass"; and in another he commits himself to the rather rash statement that "all the possible schemes put together would not form a scheme large enough to produce any appreciable difference in the development of South Africa."

If Professor Wallace is acquainted with all the "possible irrigation schemes" I presume he has information at his disposal which is unknown to most of us, but he has said enough to show that the country is well adapted for such schemes, and that when they are conducted on sound engineering principles they will pay handsomely, provided that they are settled with a suitable population.

The irrigation works actually constructed are, with one exception, a sufficient illustration of this fact. Upington, Warrington, Douglas, Kakamas and even Odendalstroom have justified the expense that has been incurred on them, to say nothing of *the many small local ventures which (I quote Professor Wallace) "have been marvellously successful in transforming what was a desert into a garden of Eden."*

To argue from the success of those already established that there cannot be more of them in spite of the "peculiarly favourable configuration of the mountain ranges," is simply arguing from the known to the unknown in a manner not usually followed in applying the inductive process.

POPULATION AND LABOUR.

Professor Wallace dwells on the large native population of the Colonies and the growing ratio of increase. It may be questioned whether the population is really increasing at a progressive ratio. It is true that the Kaffir tribes under the Pax Britannica have gradually suffered fewer checks to population from inter-tribal wars, and that they are more immune than other coloured races from the ravages of disease which generally attack the savage when he comes into contact with civilization; but the few census records that we possess tend to show that, in common with humanity generally, habits of civilization, by producing a higher standard of comfort, are likely to decrease fertility. The Professor is somewhat severe upon the hereditary laziness of the male Kaffirs, whom he describes as an uncontrolled and idle pack of female slave drivers (he means drivers of female slaves) who bask in the sun and jeer at the white man.

Mr. Wallace does the Kaffir something less than justice. For the purpose of gratifying his desires and satisfying his wants, the Kaffir is as capable of strenuous and sustained labour as any other race, as all will recognise who have watched gangs of black men discharging cargo at our wharves or excavating ore or blue ground in our mines. The Kaffir is, however, a gregarious animal, and, in the savage state, works best in gangs, where the spirit of emulation and rivalry spur him to action. It is true that the Kaffir will not work if he can get what he wants without it. As Mr. Wallace points out, the savings of "three years' labour render the provident young Kaffir independent for life," securing him a sufficient number of wives and cattle to enable him to retire from active occupation. In this, however, he does but resemble his European master, the retired tradesman or professional man, who, living on the wealth he has accumulated by his labours, enjoys his *otium cum dignitate*.

And here again we see the effect of a low standard of comfort. Should the native's wants become more numerous and cost more to satisfy, or become of a more recurrent nature so as to require repeated and sustained efforts to secure the realization of his wishes, the Kaffir's labour will become more regular and reliable, and, owing to the competition with his fellows, who also will begin to work harder and longer, the supply will become greater, and, the demand remaining the same, the wage will become less. This seems to be the solution of the problem of native labour in South Africa—a higher standard of comfort, bringing with it decreasing population and increase in the number of labourers. It is true that it is a solution involving time and patience, and the demand for labour is immediate and pressing.

In addition to this, it must be specially pointed out in discussing the "farming industry," that the Bantu has natural aptitude which should in time make him an excellent agricultural labourer. He has an inherent talent for stock-keeping, and, so far as his knowledge goes, need not yield in that respect to the white farmer. The substitution of the plough for the hoe takes one branch of agriculture out of the hands of the woman, for it is the man who follows the "jocund team a' field," and in the future he will take a greater share of actual agricultural operations than hitherto. In one respect, he already compares favourably with the Boer. Generations of despotic government and military service seems to have taught the Xosa and Zulu the value of co-operation, which is now recognized to be the vivifying principle of successful farming; and the readiness with which he and his fellows will combine to make a road or water-furrow, to build a dipping tank or exterminate a swarm of locusts, is an instructive object lesson to the proprietor of broad acre in the Karroo or grass veld. The native agricultural shows held from time to time in the Transkeian Territories show to what a high level of agricultural skill it is already possible for the Kaffir to reach.

Carefully instructed by experts, therefore, there is no reason why the Native in certain portions of this country, especially those whose climatic conditions do not suit Europeans, should not develop into a thriving agricultural peasantry, either as small proprietors who will raise sufficient agricultural and pastoral produce to maintain themselves and supply the surrounding markets, or perhaps working as farm labourers on the metayer system on large farms exploited by European capital owned by European proprietors or companies and supervised by European overseers, and thus play the role filled by the peasant cultivator in Java.

One evil will, however, undoubtedly prevent or regard such a desirable consummation, and that is drunkenness. It is probably drink alone which has brought the brown population of the Western Province to such a state of degradation that with few exceptions he ranks below the Kaffir in the labour market.

Drink must be kept from the coloured man, whether yellow, brown or black, if he is to, I will not say rise from, but remain in the place he now occupies in the scale of humanity.

Lucerne Growing as Fodder for Stock.

(Continued from page 821.)

LUCERNE GROWING VS. CEREALS IN THE KARROO.

To begin with, the rainy season of the bulk of the Karroo comes at the wrong time of the year for the sowing and reaping of wheat. We propose to discuss wheat growing principally, as it is the cereal most largely grown under irrigation in the Karroo. The opinion expressed by many progressive farmers in Victoria (Australia) is that "the man who grows wheat under irrigation is mad." Of course what is meant by this is, that far better results can be got from good ground under irrigation than by growing wheat upon it. Crops such as potatoes, fruit trees, lucerne, vines, tobacco, &c., under irrigation on good soil, will yield far greater returns per acre than wheat growing. These special crops, however, all require more care and skilled labour than cereal growing, hence, in our opinion, there is a general run on cereal growing—the lazy man's crop.

We have been often struck with a curious, antiquated idea prevailing amongst the generality of Karroo farmers, that if a man has good ground under irrigation, he "*must* grow wheat to make his own bread, and thus save buying it." The fact that he would be able, taking one year with another, to *purchase* five bags of wheat by growing lucerne where he would only have raised one bag of wheat does not seem to trouble this "grow your own bread" farmer. We have recently heard of a Cradock farmer with magnificent ground and water supply for lucerne growing, who has been growing wheat year after year, and only making a bare living out of it. He was asked recently why he did not try lucerne growing. He replied that he once did have a small patch of it in his lands, and found the infernal "boschje" a great trouble to eradicate from his wheat lands! He is probably still busy irrigating wheat crops for locusts and rust spores. It is the *uncertainty* about cereal growing in the Karroo that knocks the bottom out of it. If the fruitless expenses of the years of failure be taken into account, the occasional successful crop that is reaped has generally cost as much or more than it sells for. We repeat that in cereal growing the expense is exactly the same whether a crop is reaped or nothing is reaped. If a proper profit and loss account were kept over say seven years of wheat growing in the Karroo, it would be more readily seen by farmers how poor the average return is, and how much better it would pay them to turn their valuable lands over to the use and support of their live stock. Instead of doing this, however, with the perversity of human nature, they go on, year after year, grumbling at the "rottenness of agriculture," while at the same time allowing hundreds and often thousands of pounds worth of valuable stock to perish for want of food in droughts around the very borders of their grain lands, inside of which a rust-eaten crop of wheat stands bleaching and withering, and worthless. Often the crop reaped would not pay for the hides of the stock that have been allowed to perish *outside* the fence, because *inside* the fence that blessed cereal crop was standing on the ground, the half of which would have produced fodder enough to have saved every head of stock from perishing for want of food. Good ground under irrigation in the Karroo is far too valuable to sow year after year with wheat, barley, oats, mealies and pumpkins.

LUCERNE FOR THE KARROO.

The growing of cereals should be left to those parts of this Colony and neighbouring States where they can be grown wholesale upon the slopes and hillsides for miles and miles at a stretch, without artificial watering, and depending solely upon seasonable rainfall. Regions blessed with these natural features are naturally adapted to cereal growing. These features are possessed by some of the coast districts of the Western Province—Malmesbury and Koeberg districts, for instance—and some of the coast districts of the Eastern Province, and also the conquered territory in the Free State. The arid Karroo does not possess them, and instead of trying to coerce the Karroo into grain producing, it should be made to carry crops more suitable to its peculiarities of climate, soil and rainfall. Lucerne is just one of those crops. Where lucerne won't grow in the Karroo, cereals certainly will not. Cereals cannot, generally speaking, be grown in the Karroo without irrigation. Irrigation means the construction of weirs, dams, furrows; levelling and grading of lands, and the yearly maintenance of all these works. Wheat can be grown in such quantity, and so cheaply in the natural wheat regions just referred to, that the wheat grown under irrigation in the Karroo cannot profitably compete. We grant that it pays the Karroo grower of irrigated wheat better to grow wheat during a succession of years of drought, than it does during good years, because wheat is then a better price, but this state of affairs at best is merely temporary, being due to the shortfall of production in the natural wheat regions of the Colony and neighbouring States. One or two good seasons would again see wheat at such prices as can only mean loss, or at best, very little profit, to the Karroo grower of irrigated wheat; for the increased demand due to shortfall will create a stimulated production from the natural wheat regions referred to. For the various reasons we have just reviewed, and because nature can never be coerced, cereal growing in the karroo, even in favourable years, will never be more than an uncertain "head I win, and tail you lose" sort of undertaking. It follows that all large Government irrigation schemes in the Karroo, based upon the growing of grain, and especially wheat, are more or less foredoomed to failure. Van Wyk's Vlei scheme has already proved to be a failure for wheat growing, for which it was mainly undertaken. The Steynsburg (Thebus) scheme, if undertaken, will probably be the next failure as regards wheat growing. As a wheat growing scheme the Douglas irrigation scheme is foredoomed to failure at the prices paid to acquire plots of ground upon the site of the scheme, and the water rate imposed. It will require some far more profitable crop than grain growing to enable the Douglas scheme plot holders to work at a fair profit. The only consolation left to the taxpayer is that lucerne growing, or fruit growing, will most probably ere long supersede wheat growing upon the sites of these Government irrigation schemes, and thus eventually become a source of real profit and benefit to the country. With regard to the Slagter's Nek scheme upon the Fish River, mooted from time to time these 20 years, we do not suppose that any sane Government Commission would ever seriously recommend it after a careful inspection of the nature of the bulk of the ground lying below the proposed site. There are dozens of far more promising sites and soils for large irrigation schemes within this Colony than the Slagter's Nek site. To proceed with one subject, we assume that it will be readily granted, that, to grow cereals in the Karroo generally, irrigation has to be resorted to. Since lucerne is well known to flourish better under irrigation than cereals do, clearly lucerne answers better to the peculiar conditions existing in the Karroo than do cereals. Lucerne appears to be a plant "manufactured to order" for the Karroo and arid countries like it. All those countries of the world where lucerne has become to be regarded as "the king of fodder plants" are arid countries like the Karroo, principally devoted to stock farming on a large scale, and subject, like the Karroo, to protracted periodical droughts. Lucerne is in its glory in just such countries when it is periodically flooded and then grazed or cut with the mower. The rainfall of the Karroo, or at any rate the bulk of it, is sufficient to give it this periodical flooding by taking the water from rivers, or conserving it in large dams filled from the rivers during the rainy season.

PROFIT AND LOSS—CEREALS VS. LUCERNE—COST OF RAISING WHEAT.

We now propose to compare the profit of cereal growing under irrigation with that of lucerne growing under irrigation in the Karroo. We believe we are making a liberal estimate when we fix the average yield of wheat under irrigation in the Karroo at about five bags of 225 lbs. each, per acre, per annum, taking a series of years of failures and successes. Mr. John Eaton of "Droogvlei," in the Malmesbury district (about the best wheat district in the natural wheat region of the Western Province), a good farmer of long experience, writing to the *Cape Times* in 1886, estimated the previous five years' average yield of wheat per acre at 7½ bushels, equal to about two bags of 225 lbs. each per acre. Again, from tabulated reports of wheat yields from several coast districts of this Colony, the average yield was only six to eight bushels per acre, equal to about 1½ to two bags of 225 lbs. each per acre. The general average yield of wheat even in the United Kingdom, under scientific and heavy manuring, sure rainfall, no locusts, comparatively little rust, is only 29 to 30 bushels, or about seven to eight bags of 225 lbs. each per annum. So that our estimated Karroo average (taking the good years with the bad) of five bags of 225 lbs. each per acre, per annum, must be admitted, we think, to be a very liberal estimate for a comparison between the profits of wheat and lucerne growing in the Karroo. Of course individual yields of 10 and 12 bags, and more, per acre, have been obtained in the Karroo, but we are dealing with practical *averages* here. We have before us some figures on the "cost of wheat growing" in the Karroo, which appeared some time ago in the columns of the *Midland News*. The writer, who claimed to be a practical farmer, showed from actual account kept that wheat cost him just about 6s. per bag of 225 lbs. to produce. To arrive at the average clear profit per acre, per annum, we shall assume that the five bags of wheat, weighing 225 lbs. each (average yield of one acre), fetch an average price of say 22s. 6d. per bag on the market, realising the sum of £5 12s. 6d. Deduct from this the cost of these five bags at 6s. per bag as shown, making a total of £1 10s., leaving a net or clear profit of £4 2s. 6d—say (for easy calculation) £4 per acre, per annum.

Now, personally we have never, even in fair years, been able to make £4 per acre clear profit at wheat growing here, still less to *average* it. Nevertheless we take £4, as shown, to be a fair and liberal estimate of the average net profit per acre, per annum, derived from wheat growing. We now come to the profit per acre derived from lucerne growing for stock. By way of preliminary we may state that when once lucerne fields have been properly laid down and established, the yearly expense is almost solely confined to the mere cost of applying the water to them. On fields properly laid down, this should not exceed 5s. per acre, per annum.

COST OF GROWING LUCERNE.

We begin by quoting actual figures of results obtained recently by a leading Graaff-Reinet grower of lucerne, whose lucerne fields depend entirely upon periodical flood water diverted from the Sunday's River by means of a weir across the river. This gentleman informs us that during last year (1898) of terrible drought throughout the Midlands, he made in six months (June to December) £1,300 from fattening hamels, and £700 from making butter—a total of £2,000 in six months from about 150 acres of lucerne. Deduct from this say the six months' expenses of milking and tending the cows, and tending the hamels in the paddocks, say £100 for this, and 2s. 6d. per acre on 150 acres for water leading during the six months, amounting to £18 15s., making a total extreme for the six months of £118 15s. This will leave a profit balance of £1,881 15s. from 150 acres of lucerne in six months, being a clear profit of £12 10s. per acre in six months, or £25 per acre per annum, as against £4 per acre from wheat growing. This is between six and seven times as much as from wheat growing. This, too, during a very severe drought. This same farmer in the year 1895 made from one ten-acre field of lucerne under dairy cows, at the rate of £5 *per month, per acre,* from butter, equal to £60 per acre, per annum —this is of course exceptional. This gentleman was making £70 per month from butter in a drought when without lucerne he would have been quite unable to make butter at all. Lucerne makes the finest deep yellow "gilt edge" butter that fetches highest market price, and yet so little is known of "the king of fodder plants" that many farmers have a hazy idea that it gives butter a peculiar and bitter flavour!

Grazing ostriches upon lucerne paddocks is equally as profitable as making butter or fattening sheep upon this crop. In Oudtshoorn, where there are some 25,000 acres of ground under lucerne, the standard or average capacity of lucerne fields for ostriches is considered to be about ten birds to the morgen, or five birds to the acre all the year round. Double this number during the summer could be run on lucerne, but to be on the safe side, the number is limited to the above. The Oudtshoorn grazing is worthless, and they have to depend entirely upon their lucerne fields for keeping their birds. The statistics for 1898 show that in that year there were 48,888 ostriches in Oudtshoorn, and these *are all entirely dependent on the lucerne.* This represents about one-fifth of the total number of birds in all the other districts of the Colony put together. Now selected birds (having feathers above the average of the ordinary stock of the country) will yield, on lucerne, at least £3 per plucking per bird, clear of marketing fees. As birds running on lucerne can be plucked regularly every eight months, without any damage to the wing, three pluckings can be got in two years, yielding a total of £9 per bird per two years. This is at the rate of £4 10s. per bird per annum. We may state that our birds have done considerably better than this, but their quality is considerably above the average. Since one acre of lucerne will carry five birds all the year round and each bird will yield at least £4 10s. per annum, we have a return of £22 10s. per acre per annum, less 5s. per acre expenses water leading, leaving a clear profit of £22 5s. per acre per annum from ostriches grazed on lucerne. This is between five and six times as much as from wheat growing. Again, let us take the making of lucerne hay as compared with wheat growing. One acre will yield from each cutting about 1½ to 1¾ tons of cured hay, which means about eight tons of hay per acre per annum. But to be quite within the mark, we take only five tons of 2,000 lbs. each per acre per annum. Lucerne hay sells in Port Elizabeth at from 4/- to 5/- per 100lbs. Take it at even 4/- per 100lbs. average. At this price the five tons would realise £20. Deduct from this the expense of water leading at 5/- per acre, and expense of cutting and curing the five tons at 5/- per ton in stack. This would amount to £1 10s. expenses, which deducted from £20 (amount realized from sale of hay) would leave a clear profit of £18 10s. per acre per annum from making lucerne hay. This is from four to five times as much profit as is derived from wheat growing, and in weight it is about two or three times as much hay as is obtained from one acre of oats.

VALUE OF GROUND UNDER LUCERNE.

Even in Queensland and Victoria, where there are hundreds of thousands of acres of the most fertile grazing land, lucerne fields are found to be very valuable. At a recent auction sale of lucerne land at Bacchus Masch, in Victoria, 9 acres brought £40 per acre; 7¾ acres adjoining were sold at £60 an acre; 9½ acres at £38; 23 acres at £37; 40 acres at £30; 5 acres at £40; 4½ acres at £41 10s.; 5¾ acres at £37 10s., and 17½ acres at £40 an acre, being an average for 122 acres of a little over £37 per acre. If lucerne land is found to be so valuable in fertile Queensland and Victoria, how much more valuable ought it not to be in the arid Karroo, where it would be the means of saving hundreds of thousands of pounds worth of valuable stock during one severe drought.

The average value of ground under lucerne in Oudtshoorn, with a fair water supply, is about £100 per morgen, or £50 per acre.

Ground under lucerne on the Sunday's River Estate has recently fetched at public auction £70 per morgen, or about £35 per acre. The water supply on this estate is periodical, being flood water only. The water is diverted from Sunday's River by means of several sneezewood weirs, about five feet high, across the river.

COLONIAL EXPERIENCE.

We quote from the *Agricultural Journal*, Vol. VIII., No. 5, p. 121, Mr. Richard Gavin's own words, giving the stock-carrying capacity of his little farm of only 95 morgen, in Oudtshoorn, most of which is under lucerne. Mr. Gavin says:—"I may mention I was the first to farm with lucerne in these parts, having tried in 1863, and imported a quantity of seed in 1866, which cost landed 2s. 6d. per lb. I had made thousands of pounds (out of it) before my neighbours took to it. Now it is an acknowledged fact that lucerne has been the making of Oudtshoorn. As an example I may mention that on my farm here of 95 morgen (about 201 acres) I have at present in prime condition, 105 oxen, 17 cows and calves, 10 horses, 550 ostriches, and a lot of slaughter sheep, and have already saved about 20 tons of lucerne hay for winter, with about five morgen under wheat and oats, and *could feed double the number of stock at present,* but am always careful not to overstock, for fear of a dry summer."

We know of a Karroo farm in the Graaff-Reinet district, now owned by one of the leading and progressive farmers of that district, which was not worth more than £3,500 at the outside valuation before it was taken in hand by its present owner. Previous to being taken in hand by its present owner, it was let at £90 per annum, and were it not for a small shop or store upon the premises, even this rental could not have been paid by the tenant.

The enterprising present owner took over this unpromising farm amid the croakings of several prophets who prophesied speedy disaster. He set to work and built a weir across the Sunday's River at a cost of about £500, by means of which he can now flood from 150 to 200 acres of lucerne ground. Although before he built the weir and laid down the lucerne fields a tenant could not pay a rental of £90 per annum without the assistance of the small country "shop," the present owner has been offered £800 a year rent for this same farm, and could let it at a rental of £1,000 a year if he wished. Capitalising the rental of £800 per annum at 5 per cent., the value of this farm to-day would be about £16,000, as against £3,500 before the weir and lucerne fields were in existence upon it. An Oudtshoorn lucerne farm (Zeekoegat), including a stock of about 1,500 ostriches, was recently sold for the sum of £40,000. The property is only 3,268 morgen in extent, of which about 800 morgen are arable.

There are immense fields of lucerne in Argentina, where it has taken the place of the innutritious and scanty native grasses. In the Corowa district alone (New South Wales) there are about 21,000 acres. There are individual farmers in Australia having as much as

3,000, 4,000 and 7,000 acres of lucerne. A recent Australian writer remarks, "There will be a much larger average of lucerne laid down every year, as not only the value is so much appreciated, but many owners who have let their lands on the half system for wheat, have made a condition that the last year the land should be laid down in lucerne. I consider there is a great future before us in this plant." Having given a few instances of the value of lucerne ground here and in Australia, and having shown what the Australians think of "the King of Fodder Plants," we now proceed to discuss the

ADVANTAGES OF LUCERNE GROWING.

Lucerne fields, unlike cereal crops, are not destroyed by locusts, rust, hail and drought. Locusts seldom touch lucerne, rust does not trouble it, hail may batter but cannot destroy it like cereals. If battered level with the ground by hail, in two weeks after there will be waving a field of magnificent fodder, five or ten tons to the acre. A hail battered wheat crop, two weeks after, would be but a memory—and a sorrowful one at that. Drought that will kill lucerne, when once it is properly established, will kill the hardy Karroo itself! A field of lucerne when once established, will last, like a fruit orchard, for years; and will require comparatively little yearly expense and attention to maintain in a state of profitable production. In Oudtshoorn there are fields 15 to 20 years old as good and better than they were ten years ago. In Graaff-Reinet there is a plot of lucerne said to be about 70 years old—probably self sown from time to time. In New Mexico there are said to be fields which have been under this crop for more than 100 years. The revenue or profit from lucerne fields is both far greater and far more certain than that from cereal crops in the Karroo. To the Karroo stock farmer especially, lucerne is of inestimable value. It is one of the hardiest, yet heaviest yielding of fodder crops. If water cannot be given to lucerne fields for six or eight months no harm results. In the case of cereal crops they would be destroyed. When, after six or eight months' drought, water is again available for lucerne, this accommodating crop is ready to commence yielding enormous quantities of valuable fodder at once. With lucerne there are no yearly or half-yearly ploughings and sowings, as in the case of cereal crops. With the small area of 50 acres of lucerne at his command, no Karroo farmer need lose a single head of stock in the severest drought. With a mower and a horse rake he can cut from his 50 acres, *during one year*, fully 250 tons of the most nutritious fodder for feeding his stock during droughts. One ton of lucerne hay would often be the means of saving £100 worth of stock in a drought, and this one ton would only cost 5/- to cut, cure and stack! £100 return for a 5/- investment ought to be, in mining phrase, a payable proposition.

Lucerne hay does not deteriorate if not used at once. Professor Wallace gives an instance in Australia where a stack of lucerne hay was perfectly good more than seven years after it was put up.

Lucerne hay is not eaten and destroyed by mice and rats as is the case with oat hay. The nutritive value of lucerne hay is, besides, much higher than that of oat hay. There is a curious notion among most Karroo farmers that lucerne hay is "no good *alone*" for feeding to horses in hard work. They fancy that there *must* be oat hay, barley, or mealies added to the lucerne hay to give "substance."

On this point we quote the following remarks recently appearing in an American agricultural paper, the *Louisiana Planter* :—"Alfalfa hay is one of the richest foods for stock; it takes the place, in the farm dietary, of wheat, bran, cottonseed meal, etc. It is suitable *alone* for young growing animals and *horses at heavy work.*" The italics are ours, and we trust that this quotation of American opinion and experience will dispel from their minds the erroneous idea prevailing amongst most Karroo farmers as to the want of "substance" in lucerne hay. We may here remark that the high nutritive value of lucerne itself has been clearly demonstrated at the well-known scientific experimental fields at Rothamsted in England, where over a period of six years lucerne yielded an average of about 153 lbs. of nitrogen per acre per annum; whereas over a period of eight years vetches gave an average of only 84 lbs., Bokhara clover only 70 lbs., and red clover only 14 lbs. of nitrogen per acre per annum, as against 153 lbs. per acre from lucerne.

RESTING THE VELD.

And, lastly, we would draw special attention to this very important advantage of lucerne growing to the Karroo farmer. It enables him to relieve and *rest* portions of his stock-tramped veld by grazing most or all of his stock upon his lucerne fields during the growing and rainy seasons, and thus allow the useful grasses and bushes to grow out and to seed for the much-needed improvement and renewal of his pasturage.

He is thus enabled to put into practice the highly beneficial "paddocking system" of grazing pastures, as practised in Australia and elsewhere. This system of alternate *rest* and use has been found to quadruple the carrying capacity of pastures. Thus does lucerne growing not alone yield in itself a far better yearly return per acre than cereal growing, but it is also the means of bringing about a steadily increased stock-carrying capacity of the whole farm.

In conclusion, we wish it to be distinctly understood that we do not recommend lucerne to be sown on "dry lands" in the Karroo. By "dry lands" we mean ground that cannot be flooded at any rate, on an average, five times during the year, and well flooded too.

There is no denying the statement that drought is the one great drawback to the Karroo, the main leakage through which the Karroo farmer's profits filter away from time to time. Drought may, in fact, be said to be the great consuming dragon of the Karroo farmer's profits; there are few Karroo farmers, indeed, who have not felt his terrible fangs. Surely the drawing of this dragon's fangs should be worth the doing! The providing of artificial fodder for stock against drought is the only forceps that will draw them. The man who allows his stock to perish for want of providing water would be looked upon as mad by the very man who allows his stock to die by thousands for want of providing food. It is, however, difficult here to distinguish between the sane and the insane. It would seem that a man is mad only when he behaves differently to his neighbours.

Finally, then, we come to the

DISADVANTAGES OF LUCERNE GROWING.

There is no doubt that the initial outlay required for properly laying down permanent lucerne fields of any extent is considerably heavier than that required for ordinary cereal growing. This feature about lucerne growing is perhaps, in the strict sense of the term, not a disadvantage, yet it would have the effect of deterring the farmer of limited means from taking up lucerne growing. As in the case of fruit orchards, the lucerne grower who has just started must be prepared to wait a year or two for a return upon his outlay.

Lucerne fields yield very little the first year, and not much the second. From the second year onward lucerne becomes profitable, although it is said not to be fully matured until about the fifth year. Most Karroo farmers cannot afford to wait for a year or two for a return upon outlay, and prefer to continue ploughing for cereals year after year, even if five out of ten years they are only feeding locusts and rust spores.

Yet it is precisely the farmer of limited means who stands most in need of utilising to the very best advantage the means at his disposal for extending his limited capital. The advantages of lucerne growing are therefore of more importance to the farmer of limited capital than to the well-to-do farmer.—*First Prize Essay.* E. AND O. EVANS.

Artesian Water.

The artesian waters of Australia were dealt with by Mr. J. P. Thomson in a paper read at a recent meeting of the Royal Geographical Society of Australia. Although the whole of the Australian colonies have taken an active part in the somewhat minute and altogether elaborate search for artesian water, it is to Queensland that the greatest credit is due for having discovered the existence of an unlimited and practically inexhaustible supply in the lower cretaceous formation that underlies the vast rolling downs of the western portion of that State. Several of the inland towns and many parts of the western district are now watered by numerous artesian wells or bores. In some remarks upon the subject, the president of the Society, Sir Hugh Nelson, pointed out that up to present time the amount of artesian water brought to the surface at the bores has had very little effect as an irrigating agent upon the great areas of land in the west during seasons of drought. This water is valuable for drinking purposes for stock, but stock cannot exist upon water alone—they require herbage, and the supply of water is not plentiful enough to irrigate the runs. The Hon. A. C. Gregory also explained that artesian water contains a small percentage of saline matter, and while it might be used for irrigating small areas of cultivation the saline properties of the water have the reverse of a beneficial effect upon the land when the water is used to irrigate large tracts of country.—*Nature.*

Potato Growing and Developing.

Mr W. J. Malden, the principal of the Uckfield Agricultural College, addressing the East Sussex Farmers' Club on the subject of potato growing, emphasised the advantage of growing new and vigorous varieties rather than the old and worn-out ones. In supporting his remarks, he gave the results of tests with the new varieties carried out on the college farm this year, which we give below. The object of the lecture was to persuade Sussex farmers to take up potato growing more systematically, as, even with the exceptionally good markets at the important south coast watering places, they allowed growers at a distance to supply a very large proportion, in spite of the fact that there was a heavy railway carriage to pay, as the bulk of the potatoes had to pass through London, and the carriage alone saved gave a good working profit. The soil and climate were undoubtedly favourable for the production of good potatoes, and it seemed the main reason why there was a local idea that Sussex grown potatoes were not of a good quality was that, owing to want of interest in the subject, the matter of varieties was not gone into as much as it might, consequently worn-out varieties were grown with unsatisfactory results.

With the view of bringing to their notice some of the best new, varieties, tests were made on the college farm with a few which have recently been put on the market, viz., Sir John Llewellyn Sutton's Ninety Fold, Elberon, Pioneer, Findlay's Evergood, Findlay's Empress Queen, and Fidler's Charles Fidler. For the sake of comparison, well-known standard varieties, such as Myatt's Ashleaf, Sharpe's Victor, Beauty of Hebron, British Queen, and Up-to-Date, were grown alongside. The plots were one-twenty-fifth of an acre, the soil a light sand, an oat stubble, and manured with ten tons of farmyard manure, 4cwt. of superphosphate, and 1½cwt. of sulphate of ammonia, the planting being done on April 23.

The following results were obtained :—

Order of ripening.	Name.	Gross weight.				Chats %	Sound %	Diseased %
		Tons.	cwt.	qr.	lb.			
1. Early ..	Sharpe's Victor ..	——*a*				—*a*	—*a*	6·19
1. Early ..	Myatt's Ashleaf ..	5	15	0	7	11 82	90·50	9·49
2. Early ..	Sir John Llewellyn ..	6	0	2	18	3 88	98.73	1·26
2. Early ..	Sutton's Ninetyfold ..	5	12	3	24	4·21	96·14	3·85
3. 2nd Early..	Beauty of Hebron ..	6	15	3	23	2·68	91·12	8·88
3. 2nd Early..	Elberon	2	16	0	21	—*b*	—*b*	—*b*
4. Late 2nd ..	Evergood	13	9	2	10	3·49	100·0	0
5. Late 2nd ..	British Queen.. ..	13	14	2	22	5·69	98·60	1·39
5. Late 2nd ..	Pioneer	13	4	0	1	3·27	96·99	3·99
6. Late ..	Up-to-Date	12	6	0	4	5·94	98·30	1·69
7. Late ..	Empress Queen ..	10	11	1	0	3·27	99 06	0·93
8. Late ..	Chas. Fidler	12	13	3	11	2·19	98·87	1·12

a Seed inferior; weight withheld. *b* Not ascertained.

Specimens of all the kinds were exhibited, cooked and uncooked. The most satisfactory results were obtained from the Sir John Llewellyn, the Evergood, Empress Queen, and Charles Fidler, taking into consideration the period of ripening, the yield, and the cooking properties. The Elberon was a failure. The Pioneer showed no difference at any stage from the British Queen, despite the high price at which it was put on the market last spring. Mr Malden did not recommend its growth in place of the British Queen, which was a proved good variety. Mr Malden regarded the Evergood as one of the best varieties ever produced on the market as a second early, and could not recall its equal. The Empress Queen as a late, and the Sir John Llewellyn as a first early of distinctly new type, which was bound to be very quickly grown, were very good. The Ninety Fold appeared to have many features in common with the Llewellyn, but was rather weaker at all stages of growth. The Charles Fidler was a strong grower and cooked well. If these varieties were grown in the county there was no doubt that they would prove of great value to the grower. Mr. Malden then went into the matter of "developing" from the introducer, which was special work, but which in the hands of a skilled grower gave very high returns. He instanced the Evergood. Mr. Findlay's price for these the coming year was £60 per ton. Last year he charged £90 per ton for the limited quantity he placed on the market. Calculated at the present price of £60, a ton gave a return of £800 per acre when grown at the rate of yield obtained at the Uckfield College. The bushel of seed planted had produced over £30 worth of potatoes. Had it not been necessary to plant sets of good size, so that the conditions in each variety of the tests might be equal, it would have been possible to cut the seed to plant more than double the ground. Next year the potatoes would be worth at least £30 per ton, and the same yield would be worth £400 per acre, and with seed cut down small from two or three acres might be planted. Farming offered few such good opportunities as this. The Empress Queen, which was put on the market at £400 in 1900, was sold at £100 in 1901, and stood at £60 for this coming year, in the opinion of experts, is regarded as the successor to the Up-to-Date, and offers opportunities as great as the Evergood.

The most sensational thing ever known in agriculture was Mr. Findlay's introduction of this year, when he was putting a limited number of the Northern Star on the market at the rate of £1,120 per ton. As this would be at the rate of £400 or £500 next year, and the price would be very high for some years to come, the developer would have a great opportunity. It would be necessary to cut out each eye from a tuber and get a plant from it, and to cultivate it with as much care as a geranium and to repeat this for two or three years, when the return from the outlay would be phenomenal.—*Field.*

Algerian Trade Report.

In his report on the trade of Algeria for the year 1900, Mr Consul-General Hay-Newton writes: The year 1900 may, on the whole, be considered to have given satisfactory results with regard to agriculture, both in the land under high cultivation and in the breeding and pasturing districts. The economical situation is, unfortunately, not so satisfactory in the wine districts. On account of a prolonged rainy period in certain localities, wine growers had to contend with a continuous and severe attack of mildew, while the insect pest "altise" (flea-beetles) in parts caused considerable damage. The vintage has, nevertheless, been abundant in Algeria. The critical period of vine cultivation which Algeria is now going through, and which is due chiefly to the want of buyers consequent upon the over-production in France, is, it is to be hoped, only temporary, being the result of circumstances which may undoubtedly recur, but which are accidental. Without doubt, however, a normal increase of the vintage in France, due to the large areas replanted after the *phylloxera* troubles, must be reckoned with, but in improving the quality of the wines it is thought that Algeria can face without disadvantage the diminution in prices which the increased production in France has brought about. Experiments have been conducted latterly at Rouiba by the "Service Botanique," with a view to combat the various maladies which attack crops in Algeria, and more especially against rust. Rust has always proved a serious enemy to growers of Algerian wheat, and much attention has been bestowed upon the discovery of plants capable of resisting this malady. It is to be remarked that the climate of Rouiba is particularly favourable to rust, so that the results obtained appear to have a very real value. Various kinds of Australian wheat have been tried and favourably criticised. Leak's Rust-proof and Blount's Lambrigg are especially mentioned for their abundant yield and resistance to rust, and Allora Spring for its early maturity. Among others which seem satisfactory are Richelle Hâtive, Richelle No. 2, and the Italian wheats known as Rietti and Rietti No. 2.—*Imperial Institute Journal.*

Vegetable Growing in Algeria.

Particulars with regard to the growth of early vegetables (*primeurs*) in Algeria are published by the Director of Agriculture, who says that this industry is making such progress as to compete very seriously with the market gardens in the southern departments of France itself. Just as the products of these southern departments, notably the Var, the Eastern Pyrenees, the Bouches du Rhone and Vaucluse, have for many years been brought to the Paris markets some weeks earlier than those raised under glass in the vicinity of the capital, so Algeria is three or four weeks ahead of them in point of climate. The Director of Agriculture consequently sent M. R. Schilling, an expert in regard to fruit and vegetable cultivation, to investigate the matter. The report which M. Schilling has prepared states that in the region around Algiers the cultivation of early vegetables is carried on principally along the coast, the soil being, as a rule, a mixture of silex and chalk, very light and easy to work, but not at all deep, a good deal of manure and irrigation being required. The crops are in the ground from November to April, and by a fortunate coincidence this is the period during which the rains are most abundant. Notwithstanding this, a certain amount of irrigation is generally required. But the temperature is very favourable for early cultivation, averaging 52 degrees Fahrenheit at night and 65 degrees during the day, rarely falling below 40 degrees on the coldest nights. But special precautions have to be taken to prevent the wind from blowing the sea sand over the plantations by the erection of palisades, which cost £4 an acre, and do not last more than four years. Some of the land in the neighbourhood of Algiers fetches £160 per acre, though this is an exceptional price, the average being about £80, while the letting price is about 15 per cent. of the purchase value. The vegetables principally grown in the neighbourhood of Algiers are potatoes, French beans, greens, peas, artichokes and tomatoes, the first named being the most important element of production. The Royal Kidney, a variety of the yellow Dutch potato, is the sort mostly grown, but, the cultivators of the soil are beginning to find out that the Royal Ashleaf Kidney gives better results. The French beans share the same soil as the potato, being planted in the same ground a month or six weeks later, and when they do well the crop reaches 24 cwt. per acre. Green peas, being hardier and less affected by low temperatures, are grown more inland throughout the autumn and winter, and yield an average of 1¼ tons to the acre. The artichoke is, next to the potato, the most important item of cultivation, and the crop, which begins in December, lasts until April, as many, as 18,000 artichokes being obtained in the first year, and double that number in the second. Tomatoes, which are chiefly grown near Oran, form also a very important feature in the export of early vegetables, 5 tons to the acre being considered a good crop. M. Schilling goes on to describe the mode of packing and despatching all these vegetables to Europe, and he calculates that all the expenses of sending them to Paris amount to about £4 per ton of potatoes, £14 per ton of French beans, and £11 per ton of artichokes. He also estimates that the average annual yield is £26 per acre for tomatoes, £25 per acre for artichokes, £24 per acre for French beans, and £12 per acre for potatoes. The average quantity of exports for the last few years has been about 5,000 tons of potatoes and 4,500 tons of other early vegetables. M. Schilling dwells upon the advantages which would accrue to cultivators if they could form a syndicate for the sale of their produce, for they would be able to make better terms with the steamship companies and railways for the cost of transport and the rapidity of transit, competent persons being of opinion that in this way they could reduce their expenses by 20 or 25 per cent.—C. B. P. in the *Field*.

HORTICULTURE.

On the Selection of Stocks for the Orange in the Southern United States.

Advices from Oversea.

(Concluded from Page 836.)

On the rich alluvium of the lower Mississippi and its delta, where are situated all the large orange groves of Louisiana, the sour stock is preferred by about 90 per cent. of the planters. In a few instances sweet seedlings have been set out on the higher gravelly lands with fair results. But the sweet stock as such is almost unknown, and danger from frost precludes the use of pomelo and rough lemon stock. *Mal di gomma* is common among the sweet seedlings under the name of "sore shin." The greater part of this orange region is liable to inundation for a month or more in spring, for the river is then above the level of the land and frequent crevasses occur in the embankments. Nothing but the sour orange root can safely be used in locations subject to overflow.

In California the orange has held a leading place ever since American occupation, but the question of stock has not till lately been considered of much importance. Within the last few years, however, the introduction and remarkable success of the wild sour orange stock (*Citrus bigaradia*) of Florida has started a discussion which will result in lasting benefit to the State. Certain nurserymen who have large interests in sweet stock at stake bitterly oppose the introduction of the sour orange, and endeavour to bias public opinion by making the term sour stock include all roots except those of the sweet orange, thus seeking to make the condemnation which all California growers award to the lemon, China lemon, lime, and others as stocks, cover also the sour orange stock. The injustice of this proceeding is manifest, and cannot fail to work injury to those employing such means.

The prevailing deep rich alluvium formed from granite and limestone, and underlaid with a retentive subsoil, together with a sufficient surface irrigation form a combination of conditions to which the sour orange is peculiarly well suited.

From data sent to the Department by California orange growers who have tried the sweet and sour orange stocks side by side on a large scale, it is safe to conclude:

1. That the sour stock trees make more thrifty growth.
2. That they are more free from disease and are entirely resistent to *mal di gomma* (foot-rot or gum-disease).
3. That they are less liable to be injured by cold when young.
4. That the quality of the fruit is not impaired.

It seems high time for the California nurserymen to import sour orange seed and grow their own sour stock, which would be much more satisfactory than depending upon the sour seedlings which are now brought from Florida by the car-load, and are often poorly packed and have been long out of the ground.

The great value of the Florida rough lemon as a stock in its native state has led to some enquiry as to its probable value in California. No extended experience has been had with it in the latter State, and no positive opinion can yet be given, but its thriftiness and precocity of bearing make it worthy of a trial. It is considerably more sensitive to frost than is the sweet orange, and should invariably be budded low. If it proves desirable in other respects, it may be safely used wherever the ordinary lemon succeeds commercially. In Florida it is free from *mal di gomma.*

The following are extracts from the reports sent in by several representative growers :—

> "My investigations commenced in 1885 and have been faithfully followed up to date. Previous to 1885, all the orange trees in California were on sweet stock, the sour stock being unknown. Hence, a sweeping interest exists in sweet stock. My own orchard was of that sort, but wherever I have lost trees I have set sour stock in their place. Among the older trees I have been fighting gum-disease for five years. In some cases I have overcome it by cutting away the diseased wood and bark and painting with pure rubber-paint to exclude the air. I have always irrigated in furrows, never allowing water near the trunk of the tree, and have

> kept the ground loose with the cultivator. I can see no reason for gum-disease, except that it is characteristic of sweet stock, and I have never heard of a case on sour orange stock. I feel warranted in saying that were I putting in a new orchard, I would unquestionably use orange and lemon budded on sour stock."—*D. J. Twogood, Riverside, Ca.*
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> "Of my seventy acres, I have planted only ten with trees on sweet stock. When I made the change to sour stock, it was mostly on the ground that I could get better rooted trees at a less price on Florida sour stock than on home-grown sweet stock. I have now found that my trees on sour stock have made a better growth than trees budded on the sweet stock. Three years ago come next spring, I planted ten acres of Washington Navels (*the Bahia orange*) on sour stock. The trees were from two feet to thirty inches high. On these trees there is now about a box of oranges. In flavour, sweetness and all points that make up a first-class orange they are equal to the best fruit ever grown."—*C. E. Harwood, Ontario, Ca.*

The mysterious disease known as *mal di gomma* made its appearance in Florida and afterwards in Louisiana and California a number of years ago. It has to some degree baffled the efforts of investigators to ascertain its exact nature beyond doubt or to effect a permanent cure. The fact is that the same disease had long been known in Southern Europe under the above name, and had caused the loss of millions of dollars' worth of orange and lemon groves; also that it first appeared in the Azores, and on the Continent of Europe ten years later. It is first manifested by the appearance of a gummy effusion on the trunk of the tree close to the ground or upon the root. Even before there are any outward signs of diminished health, small drops of gum exude from the bark of the trunk, and these increase in size and number till the bark appears honeycombed or disappears. Finally, the gum liquefies and assumes a muddy brownish colour and a disagreeable odour. The most vital part of the tissues, the cambium layer between the bark and the wood, is partially destroyed, and this destruction extends till it finally girdles the tree completely and cuts off communication of moisture from the root to the upper growth of the tree. Death then follows. If the disease attacks the roots directly the death of the tree takes place much sooner—often in less than a year. The leaves change as a first visible symptom to a sickly yellow colour, but it must be kept in mind that similar leaf-yellowing may arise from other causes.

The cause of *mal di gomma* is now pretty generally believed to be bacterial if not of fungous origin. The fungilli found on the diseased parts are probably saprophytic, not truly parasitic. They come to feed on the decomposed tissues but are not the cause of the mischief. Various theories have been advanced to account for it—bad drainage and consequent waterlogged soil, hard-pan underneath, improper fertilizers, irrigating right up to the tree-trunk in basins, excess of ammonia, setting too low at planting, and so on. But some of these hold good all round, and apply to individual cases only.

A few remarks may serve to embody what is known as to the mutual influence of stock and scion, a matter which has a considerable relation to the debate upon orange grafting. While the prime object of grafting and budding is to perpetuate the characteristics of some individual plant, that is, to propagate a variety, it is clear from experience that the vigour and fertility of the scion are more or less affected by the operation. The pear grafted on the quince is dwarfed. On stocks of Kieffer pear it is made much more vigorous. On the principle that a stimulus of the vegetative growing system of the tree diminishes its reproductive powers, and, conversely, increased fruitfulness interferes with vegetative expansion, it is not difficult to understand how the working of a strong-growing scion upon a weak-growing stock will bring the tree into bearing at an early age.* But why the stock should hasten or retard the period of, or how it should change the colour, size or shape of the fruit, is not so apparent. Many of the superb varieties of the pear can only be successfully grown by us upon quince roots. The Duchesse d'Angoulême and Louise Bonne de Jersey are notable examples of this peculiarity. On the other hand, the Seckel pear needs all the vitality of a vigorous stock to bring it to perfection.

All we know about the phenomenon of dwarfing is that quince stocks give out a more meagre supply of sap, and so affect the growth of the tree that it is stunted in its growth of wood and thus thrown into bearing at an earlier age and made to produce larger and more certain crops of fruit. But the want of harmony between stock and scion has a tendency to shorten the life of the tree. A good example of the ordinary effect of stock upon scion may be found in nursery practice. A promiscuous lot of seedlings is raised, and upon these as stocks, scions of some particular sort are worked. All may be planted at the same time and under the same conditions, but the very first season's growth will develop in marked variation in individual vigour. This can hardly be referred to any cause except chance variation in the vigour of the different seedlings. Indeed, such difference in thriftiness becomes a matter of commercial importance, and according to it are determined the several grades into which nursery trees of a given variety are assorted for sale.

So far as theory goes, no influence upon the flavour of the fruit would be expected. The ascending sap furnished by the root and stock is nearly a simple fluid. It is the leaves which digest and modify this sap, absorbing carbonic acid gas from the air and forming carbon-compounds and sap properly so-called. Every bud, leaf and fruit upon a branch maintains its individuality and prepares its own nourishment out of the general supply of sap. Each separate cell of the cortex has this power of preparing food according to its nature.

Though the stock increases in size in virtue of food-sap elaborated by the leaves and sent from them down to it, yet its character is not perceptibly changed. A sprout from below the point of union is always characteristic of the original stock. But proof that the graft may communicate disease to the stock is abundant and beyond question. Yellows of the peach has been propagated thousands of times by budding, and the stock and bud die together from its effects. The familiar phenomenon of variegation, which is a sort of disease, gives an excellent example of the power of the scion to affect the stock; variegated leaves frequently appearing from the stock below the point of union, and sometimes even from stolons from the root. The *habitus* of the roots is markedly influenced, a spreading fasciculate top inducing lateral extension, and an upright axial growth encouraging deep rooting.

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*It is our habit at the Cape to forget or not to observe this correlation, and to be quite ready to accept a grafted tree of weak vegetative constitution, if we can only get a crop of fruit off it a season or two earlier than would be the case with the same scion on a more vigorous stock. Whether this haste to have a crop at the cost of strength and longevity be according to common sense, the reader may determine for himself.

A strong root produces a strong top growth, and while this remains and expands the root extends in the like ratio. If the vigorous top be cut off and a weaker one grafted on, the root is, to a great extent, paralyzed, even though it may induce a strong temporary growth. It can never do more than respond to the weaker growth grafted upon it, and, in the end, the graft becomes as weak as if it had been on its own roots.

As far as present knowledge goes, it may be summed up that 'a strong growing variety is dwarfed by union with a weaker stock, while a weak scion is not permanently benefited by grafting upon a stronger stock. In either case the flavour and quality of the fruit is only affected in proportion to the thriftiness of the tree's growth, the natural flavour or character of the fruit of the stock having no influence whatever upon the fruit of the scion.

P. MacOwan,
Government Botanist.

Meeting of Board of Horticulture.

A meeting of the Board of Horticulture was held on 6th ult. Mr. C. W. H. Kohler was elected to the Chair, and the other members present were Messrs. P. J. Cillie, C. son., W. van der Byl, H. Meyers, P. J. le Roux, J. P. Roux, H. Cloete, C.M.G., C. Lounsbury and C. Mayer.

Importation of Artificial Fertilisers.—The Committee appointed to enquire into the feasibility of importing on the co-operative principle artificial fertilisers as last year, laid its report before the meeting. In this it was recommended, that, owing to the difficulty of obtaining timely delivery from the Docks and the probability of only a few farmers placing orders with the Board, the importation should be held over for next year. Report adopted.

Schools for Poor White Boys.—The Chairman reported that the Committee appointed at the last meeting had been unable to meet, but he hoped that they would be able to prepare a report by the next meeting. Mr. Roux gave certain details as to the working of these schools which had been supplied to him by the Principal of the Stellenbosch School.

It was resolved that the Committee remain in existence and bring up a report at the next meeting.

Experiments in Wine-Making.—A letter was read from the Agricultural Department stating that arrangements have been made to enable Mr. Mayer to continue his experiments.

Agricultural Journal.—Mr. Van der Byl brought forward a motion to the effect that the usefulness of the *Agricultural Journal* would be increased if more attention were paid to matters of local interest and if advertisements relating to agricultural matters were admitted.

It was resolved, after discussion, that a Committee be appointed, consisting of Messrs. Cloete, Van der Byl and Meyers, to meet the Minister for Agriculture and the Editor of the *Journal* to discuss matters.

Resignation of Secretary.—Mr. Persse stated that, as he proposed shortly to leave Cape Town, he was compelled to resign his position of Secretary to the Board.

It was resolved, on the motion of Mr. Kohler, seconded by Mr. Cloete, that the resignation be accepted with regret, and that a cordial vote of thanks be accorded to Mr. Persse for his services as Secretary to the Board.

It was further resolved that Mr. Mayer be asked to take over the Secretaryship, and to ask the Secretary for Agriculture to confirm the appointment or to make other arrangements for filling the vacancy.

Messrs. H. Cloete, C.M.G., and W. van der Byl waited upon the Minister of Agriculture at the Agricultural Department on 24th ult. and presented the resolution referred to in the above report.

Sir Pieter Faure said the resolution evidently referred to the old condition of things that prevailed before the appointment of the new Editor, Mr. Burton. Under his care a distinct improvement has taken place in the *Journal*. Its usefulness will be increased when it is possible for the farmers, especially in the Western Province, and the Department to get into close touch once more; even now efforts are not being relaxed to bring this about. As to the advertising, suitable advertisements will probably be received after the expiration of the present printing and publishing contract in July next.

Mr. Burton said that so far as original matter of local interest was concerned three issues of the *Journal* have appeared since he became Editor, containing respectively 25, 36 and 42 pages of original matter of local interest, and there were several important papers by the Government experts. It was evident, therefore, that the suggestion of the Board on that point had been anticipated prior to their meeting, and he was very gratified to find that he was thus proved to be proceeding on popular lines. He was glad to receive the assurance of the deputation that the Board would use their influence to secure papers on matters of local interest, and he would edit any papers that were so sent and publish them if suitable.

ENTOMOLOGY.

First Report of the Natal Government Entomologist.

Matter of considerable interest to all South African farmers, and especially to those resident in the eastern parts, is contained in the first report from Mr. Claude Fuller, the Natal Government Entomologist, Department of Agriculture, Pietermaritzburg. This report, which covers the period from August, 1899, when Mr. Fuller left the service of the Cape Government to join that of the sister Colony, to the close of 1900, was recently issued, and is now being distributed. It is a profusely illustrated volume of 150 pages, and withal, particularly when one considers the hundred and one vexations involved in publishing a work of its kind through a colonial contract printer, it reflects great credit on its author.

The report is divided into three parts. Part I. consists of a general statement of the work accomplished. Part II. treats of special subjects and includes interesting accounts of Forage Blight or Oat Rust, Mealie Variegation, and the parasitic Witchweed of mealie lands. Oat rust has blasted forage in Natal these last few years as it has in this Colony, and is being circumvented there as here by the cultivation of resistant varieties. Mealie Variegation is the name assigned to an obscure affection of the mealie plant, characterized by a peculiar mottling of the foliage. A few years ago the trouble gave rise to grave apprehensions, but Mr. Fuller makes it evident that little actual damage is done.

Part III. constitutes three-fourths of the report, and is written purposely and solely for the direct information of the farming population. It is really a short manual of entomology without technicalities. Each group of insects is taken up in order, and after a brief description of its superficial character it is illustrated by the common Natal insects of that kind. Thus the well-known Lucerne Caterpillar is dealt with under butterflies, the Mealie Stalk Borer, Fruit Moths and other familiar caterpillars and moth pests under moths, the Fruit Fly under flies, and the Red-wing Locust under locusts. Almost all of the insects discussed are known to the farmers of Cape Colony, and those farmers who wish to add to their bookhelves a reference book on insects should endeavour to secure a opy of the report. Through the kindness of the Honourable the Minister for Agriculture of Natal, at the request of Mr. Fuller, a small number has been assigned to this office for free distribution in Cape Colony, and I shall be pleased to receive applications, accompanied by 3½d. to cover postage, addressed to Entomologist, Department of Agriculture, Cape Town.

Whilst most of the Natal insects classed as pestiferous by Mr. Fuller are pests in the Cape Colony as well, he dwells at length on a few with which we are still happily unacquainted. The common Fruit Fly of Natal (*Ceratitis cosyra*) is not the Fruit Fly of the Cape (*Ceratitis capitata*). Ours is bad enough, we all realize, and many Eastern Province people think it could not be worse, but even when it entirely destroys the peaches, it rarely harms the loquats, and seldom, if ever, the Japanese plums. The Natal species, Mr. Fuller tells us, attacks practically all the cultivated fruits, including all sorts of plums, loquats, yellow guavas and red China guavas, and besides infests some wild fruits. The yellow berries of *Solanum giganteum*, a large rough-leaved, tree-like plant, with fruit in clusters, are freely attacked. The plant, called by some "Wild Tobacco," grows profusely in waste lands about our towns, and if the Natal Fruit Fly should get to us, its fruit would furnish food for a generation of flies early in the season, and thus practically ensure severe havoc to late cultivated fruits. Almost needless to say, the fruit and plant inspectors at our ports have been notified to be on the watch for the pest in imported fruit.

Another bad fruit pest is designated "Natal Codling Moth." This creature we have to at least a limited extent along our eastern frontier near the coast, and much will probably be heard of it if the Eastern Province people ever succeed in their vaunted ambition to become great producers of fruit. The true codling moth confines its attentions almost entirely to apples and pears, but the Natal namesake attacks plums of various kinds, apricots, peaches, yellow and red guavas, oranges and mandarins (naartjes). The last three fruits are said to suffer the most, and the loss of 40,000 fruits last season in one orchard of orange and mandarin trees is cited.

Fruit-sucking moths of various kinds have been prominent insects in Natal as in our east during the past two or three years. Concerning remedial measures Mr. Fuller says: "Too little is as yet known of these pests to recommend any course of treatment except the use of netting similar to that for keeping off the attack of the fruit fly. Eventually some way may be discovered of circumventing the pests, but this will only follow upon a knowledge of their natural histories. Hanging poisoned baits in the fruit trees will, I believe, from my own experience, prove successful, and Mr. J. Harcourt, Richmond, attributes the immunity of his fruit from moth attack to systematic trapping. For this purpose he originally employed lamps standing in wide milk pans in which there was water with paraffin floating on the surface. He now, however, prefers to use wide-mouthed jars, suspending them in the trees, and keeping them half full of a mixture of vinegar, sugar and water.

The Jigger Flea (*Sarcopsylla penetrans*) is a stranger to us and we wish it would always remain so; yet the chances are that we will get it within the next decade. It is thought to have reached Natal about 1897 from Lorenço Marques, and to have arrived thence along the coast from Zanzibar after having crossed the continent from the Congo. This flea is remarkable from the habit the female has of penetrating the foot of man and therein depositing her eggs. She distends to the size of a pea before starting to lay, and her presence sets up severe and painful inflammation. Naturally the bare-footed natives and Indians are more frequently attacked than the booted whites, and, because of the relative toughness of the skin, the insects are extracted with greater difficulty from the feet of the former. Work on some of the coast estates is said to have been severely handicapped at times by the numbers of labourers temporarily crippled by the insect.

The Red Scale, it is interesting to learn, does little damage in the sections of Natal lying below 3,000 feet in altitude, it being kept in check, apparently, by a fungous disease, *Sphærobastibile coccophila.* This fungus is found in our Colony, but with us it is of little value against the scale, presumably owing to unfavourable climatic conditions. The citrus fruits of the Natal coastal section, though having little Red Scale, are greatly pestered with scales of other kinds. The Mussel or Purple Scale (*Mytilaspis citricola*) is evidently as great a pest there as the Red Scale is with us, and it is harder to contend against.

The Pear Slug and the Codling Moth, two almost cosmopolitan pests, whose costly acquaintance our Western Province fruit growers are being compelled to make, and numerous other widespread fruit pests, are still absent from Natal; and Mr. Fuller hopes that their import inspection measures will suffice to exclude such undesirable insects. The regulations requiring the inspection of imported fruit and plants were secured only very recently. Their expediency is evident from the casual mention of several novelties in pests unintentionally introduced into the country, within a few years, with consignments of nursery stock. The black spot of the peach, the crown gall of nearly all fruit trees, and a boring insect, got into the country by this channel, and it is highly probable that they will make their mark—very literally—on Natal fruit.

CHAS. P. LOUNSBURY,
Government Entomologist.

Some Results of the Introduction of Parasites and Predaceous Insects into California.

California was the first State in the United States to inaugurate the system of fighting insect pests with their natural enemies, and the rewards that State has reaped from that method has been worth many million pounds sterling to it. In fact had it not been for the introduction of the natural enemies of the white cottony cushion scale (*Icerya purchasi*), the growing of citrus fruits in that State would have been abandoned years ago. As it was, there were many hundreds of acres of fine bearing citrus trees totally destroyed by that scale, and thousands of acres infested by it that would also soon have been abandoned had it not been for the introduction of *Vedalia cardinalis* from Australia by Professor Albert Koebele. Notwithstanding all of the Yankee ingenuity that was displayed in the artificial methods of combating this scale, its spread could not be checked. But in less than six months after the introduction of the little ladybird from this country it rid the State of that pest, and the State Board of Horticulture there found it necessary to erect breeding houses for the propagation of the scale in order tó keep the ladybirds alive.

Since the discovery of *Vedalia cardinalis* Mr. Koebele discovered a second ladybird, also in Australia (*Novius koebelei*), that is equally as effectual in the destruction of *Icerya* as the *Vedalia*. Another valuable enemy of this scale, an internal parasite (*Lestophonus Iceryæ*), was also discovered by Mr. Koebele in Australia and established in California. Following the above-mentioned discoveries by Mr. Koebele, the writer discovered two species of ladybirds yet unnamed in this country that are also effectual enemies of *Icerya* and have been established in that State. Another remarkable parasite of this scale was discovered by the writer in New South Wales, being a small chalcid fly (*Ophelosia crawfordi*); this has also been successfully established in California. The writer had been requested by the State Board of Horticulture of that State not to send any more enemies of *Icerya*, as it was impossible to secure food scale enough to keep them alive there, otherwise three other species of ladybirds could have been introduced into that State from Ceylon and Java, any of which would have been able to cope with the scale and hold it in subjection.

The yellow scale (*Aspidiotus citrinus*), a very close relation of the red scale (*Aspidiotus aurantii*), was once a very serious pest of the citrus trees of California, and the tops of thousands of trees were cut off in hopes of checking its spread, but, notwithstanding this severe treatment, its spread continued. But by the accidental introduction of its true parasite, a small chalcid fly (*Aspidiotophagus citrinus*), from Japan, it soon became a harmless scale, and is no longer noticed [illegible] growers.

The brown apricot scale (*Lecanium armeniacum*), once a serious pest in some districts of California, attacked the prune and plum trees as well as the apricot. This, too, was also soon brought into subjection by the introduction of its natural enemy, also a chalcid fly (*Comys fusca*); this scale is also no longer looked upon as a pest there.

San Jose scale (*Aspidiotus perniciosus*).—This scale first came into prominence in California some years ago, and derived its common name after the locality in which it first made its appearance; however, it is not a native of that State, but probably indigenous to Japan. The writer, last season, while in China, found apples that were grown in the northern section of that country that were infested with scattered specimens of scale, and yet it has never been recorded as a pest from there, no doubt owing to its natural enemies keeping it in check. At one time this pest caused a great amount of damage to the growers of deciduous fruits in California, and thousands of dollars were annually expended in the spraying of infested orchards. Now this scale is no longer feared there since the State Board of Horticulture began the distribution of the little internal chalcid fly parasite (*Aphelinus fuscipennis*) to all infested sections. There are also two species of ladybirds that feed upon this scale there, the twice stabbed (*Chilocorus bivulnerus*) and the brown necked ladybird (*Rhizobius debilis*), the scale being held in complete subjection there at the present time. There are a few orchards in California at present where the scale may be found plentiful at times; this is caused, however, from' the fact that the orchards in the localities where they are have to be sprayed for fungous diseases, and the strong smelling remedies used keep the parasites away. Of recent years this scale has made its appearance in a number of the Eastern States of the Union, and has caused an enormous amount of damage, and, up to very recently, the entomologists of those States placed little or no value upon California's policy of fostering and distributing beneficial insects for the suppression of noxious ones. But now, after the expenditure of large sums of money and the destruction of thousands of trees, some of the most noted professors there have begun to open their eyes, and Professor W. G. Johnson, of Maryland, read a paper before the twelfth annual meeting of the Association of Economic Entomologists in the City of New York, June 1900. The following extract is from the paper read: "Last fall I discovered a new locality for *Aphelinus fuscipennis* near Easton, Talbot County, in an infested orchard along the Miles River. The orchard contained a miscellaneous variety of fruits, and all the trees were quite seriously infested with the 'San Jose scale.' Instructions have been given the owner to cut the trees down as soon as possible and burn them. A quantity of small branches infested with the scale was brought to the laboratory and enclosed in breeding tubes. Much to my surprise these tubes were swarming with parasites a few days later; from one tube 1,114 specimens of *Aphelinus fuscipennis* were taken, while a second tube gave 482, a third 1,478, and a fourth more than 1,000."

The lack of knowledge of the existence of these parasites in the orchard mentioned by Professor Johnson, caused the trees to be destroyed, which if they had been standing would in a very short time become free from the scale. When a few branches placed in four small breeding tubes produced over 4,000 parasites in a few days, according to Professor Johnson's own figures, how many must the whole orchard have contained ?

Black Scale (*Lecanium oleæ*).—It was expected that with the introduction of the ladybird (*Rhizobus ventralis*) from Australia, by Mr. Koebele, this pest would soon have been numbered among the harmless ones there, but owing to climate conditions these expectations were only realised by a portion of the growers. In the moist sections of the State they accomplished all that was expected of them, but in the drier regions they proved a disappointment. But during the past eighteen months five species of internal parasites have been introduced into that State, which will no doubt soon bring this scale into complete subjection in all sections of the State. One species yet unnamed was discovered at the Hawaiian Islands, where it keeps this scale in such complete subjection that it is almost impossible to find any living specimens of the scale. This attacks the scale in its first stages. Another was first discovered at Brisbane. This was also a new genus and was described by Mr. W. H. Ashmead, and named *Myiocnema comperei.* This is also a parasite of the scale and destroys it before it is half grown, while the third one is also a new species, and named by Mr. Ashmead *Hemencyotus crawii.* This is a parasite upon the eggs of the scale, and its work is similar to that of *Dilophoqaster californica* and was first discovered in New South Wales. Through the kindness of Professor Charles P. Lounsbury, Government Entomologist, Cape of Good Hope, two species of internal parasites were sent to California, *Aphycus lounsburyi* and *Scutellista cyanea.* These two, Mr. Lounsbury claims, keep the black scale in check in that country.

The *Thalpochares coccophagus* moth, the larva of which feeds upon the black scale in various sections of Australia, has been repeatedly sent to California, but it never has become established there. The ladybird, *Orcus australasiæ,* has also failed to become established there after repeated sendings.

The European cabbage butterfly, *Pieris rapæ,* which was a few years ago a serious pest to the cabbage growers of California, is now no longer looked upon as a pest there, being held in check by two parasites, one a Tachina fly, and the other a small hymenopterous parasite.

The various species of mealy bugs (*Dactylopius*) are held in check there by parasites.

A parasite of the red scale (*Aspidiotus aurantii*) was also discovered by the writer in China, and from material sent last October, and placed in breeding jars at San Francisco, the first parasites made their appearance only about three months ago, nine months after sending. This parasite holds the red scale in complete subjection in the parts of China visited, and no doubt will do the same in California if it once becomes established there.

The dipterous parasite (*Masicera pachytyli*) of the plague locust have also been successfully established in California. These were secured at Corowa, N.S.W.

The Hawaiian Government a few years ago adopted California's plan of fighting the insect pests of those Islands, and employed Professor Albert Koebeole for that purpose with great success.—GEORGE COMPERE in *Journal of the Department of Agriculture, W. Australia.*

VITICULTURE.

The Propagation and Cultivation of the Vine in South Africa.

BY MR. J. P. DE WAAL.

(*Concluded from page* 850.)

Trellises should be put up in the season following that in which the vineyard is laid out, and in the planting season the young vines should be staked in order to produce straight trunks from 1½ to 2 feet in height from the head of which the arms of the vines will branch out along the lower wire.

Stout and well-matured Spanish reeds will answer well as stakes for such young vines, and vignerons intending to go in for trellising should therefore in good time lay out plantations of these reeds along their main water furrows or in swampy waste land.

PRUNING.

The best time for pruning varies with the variety of vine, district, soil and site, and has to be learned from local experience. The fruit-pruning season ranges over a period of three months, from the middle of June to the middle of September. The vineyards on dry mountain slopes will bud earlier than those in low lying cold valleys and should be pruned comparatively earlier also; similarly, early budding varieties should be pruned before late sorts.

The best time for pruning in different localities can be found out by the new comer from practical men in the neighbourhood, as this is a subject which vignerons usually study with very close observation.

As a rule, early pruning makes stronger wood and late pruning gives a heavier crop of grapes, from which it follows that young and weak-wooded vineyards should always be pruned before older and healthier vineyards.

As the pruning comes off at a very busy season of the year and at a time when, owing to winter rains, the labourers are frequently prevented from turning out to work, a good practice, largely followed by the Western Province wine farmers, is to "clean-prune" the vineyards in autumn when the leaves begin to turn yellow. This clean-pruning consists in the removal of suckers and such shoots as are not likely to be required for bearers. The autumn is a slack time of the year for the wine farmer, and the clean-pruning greatly facilitates the future fruit pruning and does no harm to the vine.

The clean-pruning period also varies in different localities and extends from the beginning of April to the middle of June.

CULTIVATION OF VINEYARDS.

In dealing with the broad question of cultivation it is necessary to divide the subject into two headings, viz.: winter and summer cultivation.

Winter Cultivation consists in turning the soil over to an average depth of about 6 inches for the double purpose of loosening it and destroying the weeds. This cultivation is done either by hand-digging with spades or forks, by ploughing up the land with specially constructed vineyard ploughs, or by a combined digging and ploughing. Hand-digging makes the best work, but cannot be carried out on a large scale on account of scarcity of labour and its costliness.

The special ploughs constructed for vineyard work answer the purpose very well and enable the vigneron to have large areas cultivated at small cost.

The winter cultivation should generally be commenced with as soon as the ground is soft enough after the first rains have fallen. If the cultivation be then delayed, a crop of weeds will soon spring up and the work will be made much more troublesome and expensive. In particular cases, however, where green manuring will be of advantage, such as in very sandy or stiff clayey soils, the cultivation may be put off until a good crop of grass can be turned over, which, in decomposing, will improve the physical nature of the land.

The *Summer Cultivation* consists in keeping the land loose, open, and free from weeds. This work is done by combined hand and horse-hoeing and should be continued up to the time when the grapes start colouring. It should be borne in mind that one of the effects of cultivation is that the natural moisture of the land is largely preserved, and in that respect it serves the same purpose as irrigation.

Excessive cultivation of vineyards, newly laid out, on unprotected wind-swept sites and in loose or sandy soil should, however, be guarded against, as a heavy wind storm may blow away the loose upper strata of the land and greatly damage the young vines.

MANURING.

The vine, in common with other plant growth, requires a sufficient supply of the compounds of the three main elements of plant food—nitrogen, phosphoric oxide and potash—in order to produce a full crop. Lime enters largely also into the composition of the different parts of the vine and has an important effect on its general health and on the quality of its produce. Where soils are deficient in lime, this element of plant food should also be included in the manure.

According to Von Babo & Mach's standard work on viticulture, the vines on an acre of land abstract, on an average, the undermentioned quantities of above elements of plant food from the soil yearly:—

67 lbs.	of Nitrogen.
60 lbs.	of Potash.
53 lbs.	of Lime.
15 lbs.	of Phosphoric Oxide.

The above data will give the viticulturist a rough idea of what the fertilisers that he buys in the market should consist of.

Some naturally rich soils can do without manure for a number of years, and, when a superior quality of wine is gone in for, the vines should, as a rule, only receive manure when they show a want for it.

THE BEST MANURE.

The best vine manure is a well-rotted compost, consisting of the manure of animals (horses, cattle, sheep, goats, pigs, &c.), vegetable matter (veld bushes, hedge prunings, vine cuttings, tree leaves, straw, glass, &c.), and other refuse, such as road-scrapings, wood ashes, burnt and unburnt bones, &c.

If such a compost is well prepared and preserved, it will contain all the necessary elements of plant food, and will besides have a good physical effect on the soil in various ways, especially by loosening and opening stiff, clayey soils and increasing the humidity of dry, sandy soils. A mixed farmyard manure of the kind described can either be applied in holes or furrows, which should be made about 18 inches deep. A large portion of the manure will only gradually become soluble and available for plant food, and if the manure is not buried to a sufficient depth it will dry out in the summer months and be more or less useless for that season. If holes are gone in for, they should be made midway between four vines. On poor soils, manure is generally applied every alternate year, or every third year, according to the growth of the vines, and the holes should be successively made in a new square, so that it will take 8 or 12 years before the same hole is opened again. Furrows are made successively in alternate rows of vines and are drawn with a plough, followed up by the spade if the plough does not go deep enough.

When farmyard manure is used, holes are generally preferred, as, owing to the slow decomposition of the manure, it is not considered advisable to turn it up again before it is thoroughly exhausted by the roots, which is sure to be the case after it has been buried for a period of 8 to 12 years as described.

A bushel of farmyard manure is generally allotted to every hole when vines are planted 4ft. square, and that quantity can serve as a basis of calculation for the requirements of vines planted wider apart. The manure should be put into the ground as early in the season as possible or, in other words, as soon as the winter rains have soaked in to a sufficient depth to enable the holes to be made. Before the rainy period commences, the manure should be carted out of the compost-holes, or cattle kraals, into heaps on the vineyard roads, from where it is carried off into the vineyard with baskets. The compost-holes and kraals are rarely covered over by a roof, and if the manure is not removed before the rains have set in it will become very wet and heavy for further handling. On the vineyard roads, the manure should not be left longer than is absolutely unavoidable, as otherwise its most valuable portion—the soluble constituents—will be drenched out by the rains.

After the manure has been thrown into the holes, all prunings, weeds or leaves that are lying about are thrown in on the top of it. In some cases, where the manure is of poor quality, an artificial fertiliser is also added to it after it had been deposited in the holes. When the manure, &c., has been thrown into the holes, a layer of a couple of inches of soil is spread over the mixture to prevent loss by evaporation. The holes are left open till after one or two strong rains have fallen—which will aid in washing some of the soluble constituents of the manure down to the roots for immediate use—and then closed up.

CONCENTRATED AND ARTIFICIAL MANURES.

In cases where there is not a sufficient quantity of farmyard manure available, recourse must be had to other fertilisers, either natural or artificial.

Amongst the natural fertilisers, more or less suitable as vine manures, may be mentioned the large deposits of pure kraal manure in the Karoo districts, guano, poudrette, bonemeal, fish offal, wood ashes, lime, &c., and, amongst artificials, there are several good patent and proprietary manures in the market, for full details of which the reader must turn to the volumes of the *Agricultural Journal*, issued by the Department of Agriculture, as it is not within the scope of this short treatise to deal with this comprehensive subject exhaustively. Suffice it to say that, in vineyards where the crop is used for making wine of a high class, concentrated nitrogenous manures should be sparingly used, say at the rate of 500 to 1,000 lbs. to the acre, as a large percentage of nitrogenous matter in the grape is not conducive to the making of a good wine. For brandy making and the production of table grapes, this quantity can be increased.

Complete fertilisers, imported and manufactured by various Colonial firms, with due regard to the special requirements of the vine can be applied at the rate of 1,000 to 2,000 lbs. to the acre. There was a time when the public was quite as much imposed upon, by the unscrupulous merchant, with patent manures as with patent cures. With the advancement of knowledge, things have greatly improved, and most merchants are now publishing the analysis of their fertilisers in their advertisements. What the farmer must now do, in case of doubt, is to get from the merchant, at the time of purchase, a certified copy of the printed analysis to the effect that the parcel of manure bought by him contains the elements of plant food in quantity and solubility as stated. No merchant doing a straightforward, honest business will refuse to give the buyer such a certificate.

The following table of the money value of the four main elements of plant food represents roughly the basis (at Cape Town prices) on which the values of fertilisers are calculated in the Government Analytical Laboratory:—

Lime—in the form of pure unslacked lime ...	½d.	per lb.
Potash	3¼d.	,,
Nitrogen	9d.	,,
Soluble Phosphoric Oxide	3½d.	,,
Insoluble ,, ...	2d.	,,

Calculated at these rates as an example, the value of a ton of guano of average quality will work out as follows:—

	Per cent. (or per 100 lbs.)	Per ton of 2,000 lbs.	Value. —	Total. — £	s.	d.
Lime ...	14	280	½d. per lb.	0	11	8
Potash ...	2	40	3¼d. ,,	0	10	10
Nitrogen ...	8	160	9d. ,,	6	0	0
Sol.Phos.Oxide	2	40	3½d. ,,	0	11	8
Insoluble ,,	10	200	2d. ,,	0	16	8
				£8	10	10

In the case of mixed fertilisers, prepared for a special purpose, the cost of preparation will have to be added to above valuation.

Like with other commodities, the prices of manures are fluctuating according to supply and demand.

A point that must also be borne in mind is that the analysis of a fertiliser will only give a rough idea of its immediate value as a manure, inasmuch as only a portion of its ingredients may be readily available as plant food. It would have been noticed that phosphoric oxide has a higher and lower value according to the form in which it exists in the manure—soluble or insoluble. In buying manures by analysis, this point is of importance to the farmer and a short explanation will not be out of place.

When determining the value of fertilisers, according to their content of plant food, chemists imitate nature as far as possible. It has been proved by conclusive experiments that plants take up their food from the soil not only when it is in the state of a watery solution, but that from the roots of the plant an acid is secreted which dissolves solid plant food elements in the soil and enables the roots to absorb the plant food thus dissolved. Following up that discovery, chemists now employ an organic acid, namely citric acid, as a solvent for the plant food in fertilisers, as by the use of that acid the solvent action of the root acid is closely imitated. When the analysis of a fertiliser shows a certain percentage of its phosphoric oxide as soluble it generally means that that amount is soluble in citric acid and likely to be in a form in which it can directly be taken up by the roots of plants, whereas the insoluble portion has first to undergo decomposition for a period of months or years before it is reduced to a form available for the plant.

A phosphatic fertiliser, such as basic slag, may show by analysis to contain 20 per cent. phosphoric oxide out of which only 5 per cent. may be soluble. The difference in the value of such a sample of slag, if the value of phosphoric oxide be calculated at the higher rate only and at the differential rates laid down in the price list, will be £1 17s. 6d., as shown by the following calculation :—

20 per cent.=400 lbs. to the ton at 3½d. per lb. =£5 16 8
5 per cent. (sol.)=100 lbs. per ton at 3½d.= £1 9 2 } = 3 19 2
15 „ (insol.)=300 lbs. per ton at 2d.= 2 10 0 }

It is therefore of great importance to the farmer that he should go about his business in a thorough manner, and, if he should decide to buy his fertilisers by analysis, that such analysis should show both the soluble and insoluble amount of phosphoric oxide. In the case of the other plant food constituents it has not been found necessary that such a distinction should be made.

GUANO.

For vines that are weak in wood and for which a strong stimulant is required, guano can be highly recommended. It is generally supposed that the guano, derived from the islands round about our coasts, is a one-sided nitrogenous manure, but the analyses of the article certainly do not bear out that prevalent idea.

The average percentages of the four essential elements of plant food found in 25 different samples of guano, selected and examined at various times, during the period 1890-1898, by six different Government Analysts are as follows :—

Lime	13·35
Potash	2·09
Nitrogen (Ammonia)	8·45
Oxide (total)	12·69

It will thus be seen that Cape guano is distinctly a nitrogenous-phosphatic guano, and, as it contains lime and a small quantity of potash as well, it may in a sense be regarded as a general manure. As a vine-manure by itself it is too low in potash and rather rich in nitrogen; but in conjunction with farmyard manure, which is generally very poor in nitrogen and comparatively rich in potash, it is known to give very good results when applied to vines and can safely be recommended.

Concentrated and artificial manures are more advantageously applied in furrows than in holes, as they get better mixed up with the soil in the furrows and will be less likely to cause injury to the tender roots. As an additional safeguard against such injury, the fertilisers should be well stirred up with the loose soil in the furrows. In such fertilisers the plant food is generally pretty soluble and will have been leached out by the rains before the furrows are opened again in 4 or 6 years time. These fertilisers are also generally applied later in the season than farmyard manure.

The time for putting such concentrated fertilisers into the ground will depend largely on their nature and on the physical qualities of the soil. Land with a substratum of clay that will absorb and retain the soluble portion of the manure can be manured earlier in the season than loose sandy soils that have not got such retentive properties; and highly soluble manures, such as superphosphates and guano, should be applied later in the season than a slow acting manure such as bone meal

LIME.

As most of our vine soils are very poor in *lime* and this article can be cheaply obtained, it can be broadcasted liberally at the rate of a ton or more per acre—heavier dressings on clay soils and land full of vegetable matter than on sandy soils.

According to a series of analyses made, by Government and private analysts, the soils of the Cape, Malmesbury, Stellenbosch, Paarl, Tulbagh, Caledon and Bredasdorp Divisions contain on an average less than ½ per cent. of lime. Analyses of Worcester, Robertson and Swellendam soils showed an average lime content of from ½ to 1 per cent.

With regard to the use of lime, it must be remembered that agricultural chemists claim for it a fourfold effect on the soil:—

1. It serves as a direct plant food.
2. It combines with and breaks up compounds of inavailable plant food and sets the plant food in such compounds free for the use of the plant, *e.g.* potash, ammonia.
3. It has a good physical effect on clay soils and makes them more friable and pervious.
4. It neutralises the sourness of soils, which causes a sickly plant growth. As such sourness is due to the action of excess of water on the vegetable matter in the soil, liming, to be effective, should be accompanied by draining.

Lime should be added to the soil in a burnt condition, as, by slaking the burnt lime, it can be reduced to a much finer powder than the limestone or shells could be by mechanical means, and the finer its state of division the more intimately it can be mixed with the soil and the sooner it will exert its beneficial influence. The burning also reduces the lime to a caustic state, in which it has a more powerful effect than in the natural state. The beneficial effects of lime will generally be more noticeable in the 2nd and 3rd year than in the first.

With regard to the application of nitrogen, it must be remembered that although the vines abstract a larger quantity of that plant food from the soil than of any of the other essential elements, it is present in the air in combination with other gases and is washed down into the soil by rains and absorbed by the soil, especially when damp, in quite appreciable quantities. Chemists estimate that the amount of nitrogen by which the soil may thus be enriched varies with circumstances from 5 lbs. to 20 lbs. per acre per year.

In our pure South African atmosphere, comparatively free from gases arising from the decomposition of vegetable and animal matter, it is likely to approach the minimum and perhaps to go below it.

Agricultural chemists have also proved that plants receive a portion of their nitrogen through a process of nitrification going on in the soil by means of bacteria with which loose, open, well-drained soil is teeming and which produce nitrogen in a form available for the plants out of non-available nitrogenous compounds.

SULPHURING.

In 1858 the fungoid vine disease, well known by the name of Oïdium, was first detected at the Cape on the High Constantia estate in the Cape Peninsula. Soon after its establishment it spread rapidly inland and caused a great deal of damage. As the disease made its appearance in the European vineyards about 10 years earlier, the Cape vignerons soon received advice from Europe as to the best remedy against the new disease. Fortunately it was discovered in Europe that the use of flowers of sulphur was an excellent remedy, though not quite a complete one in certain localities, and the Cape men were not slow to benefit by that experience. The best way of applying the sulphur is to blow it on the vines as a fine dust with a pair of sulphur bellows specially constructed for the purpose.

In districts with a damp climate, like Constantia, sulphuring should be commenced with when the young vine shoots are about 6 inches long, whether there are any signs of the disease or not, and continued fortnightly until the grapes turn colour. Frequent small doses are far more effective than fewer large doses, and the sulphuring should always be repeated on the first suitable day after a rain. It is a good principle rather to use too much than too little sulphur, as a saving of a couple of hundred pounds may mean the loss of 25 to 50 per cent. of the crop and turn out to be very false economy. The work is most effectively done on calm sunny days after the dew is off the vines. If the leaves are wet with dew, they will catch up the sulphur and prevent it from penetrating through the whole body of the vine.

Some grape varieties, such as the Stein, are attacked by the disease in a worse degree than others, and have to get a couple of extra doses of sulphur.

In Constantia the average quantity of sulphur required for a season is 80 lbs. per acre, but in districts with a dry climate only a quarter of that supply may be found sufficient. As regards the quality of sulphur to be used, two main points deserve attention :—

(*a*) The sulphur should be in the finest possible state of division.

(*b*) The sulphur should not be damp.

The finer the sulphur, the greater the surface that it will cover, the better it will cling to the leaves and other parts of the vine, and the more rapidly it will oxidise and produce acid vapours which mainly destroy the oïdium fungi. We say "mainly," as it is presumed that sulphur destroys fungus directly by mechanical contact as well as in the oxidised or vaporous form.

If the sulphur is damp, it will be cloggy and not dusty. In such a condition, the work of sulphuring cannot be carried out with that despatch which every practical vigneron knows to be so desirable, as in many seasons the days or portions of days suitable for sulphuring are so very few.

Analyses at the Government Laboratory have proved that the different brands of sulphur in the trade are remarkably free from adulteration, so that, for the present at least, the viticulturist need not trouble himself in regard to the purity of that article.

TOPPING.

By the term "topping" we understand the cutting off of the tops of the young vine shoots when they have reached a certain stage of development. Until the young vine comes into bearing, the shoots should be topped as little as possible, as a heavy foliage will produce strong wood growth and is practically as beneficial to the young vine as a heavy manuring. Supposing a farmer manures his young vines heavily, but keeps topping them very short, as the writer has not infrequently observed, he is largely taking away with the one hand what he has been supplying with the other. The result is that his young vines will remain dwarfish and make very slow progress. One need only watch the effect of frequent topping on hedge plants to see how stunted they get in their growth. The reason given for this short topping is to prevent damage from strong wind. Whilst a certain amount of topping against wind storms is admitted to be necessary, there is no doubt that the practice is often overdone.

There are other safeguards against wind storms besides short topping, such as earthing-up and staking of the young vines and the erection or planting of wind screens.

Excessive topping is equally harmful to older vines that are in bearing, but a reasonable amount of topping is required to keep the vine within certain limits necessary for carrying on the vineyard work, more especially when the vines are trained low, on the bush-system already described.

Bearing vines, low on the ground, require more topping than old vines with a high stem, as one of the objects of topping, in the case of low vines, is to make the shoots stand up and keep the grapes off the ground.

In the case of bearing vines, the object is not so much wood growth as the production of fruit, and a judicious topping causes the sap, which would otherwise have passed on to the end of the shoot, to divert into the bunches of grapes, which are thereby noticeably developed.

Topping should commence shortly after the flowering period of the grapes, when the shoots are about 18 inches long, and is then best performed with a long-bladed sharp knife. Later in the season, when the shoots become woody, a sickle can be used.

In wet years, heavier topping is required towards the close of the growing period than otherwise, the object being to let the grapes get the maximum benefit of the sun's heat for the double purpose of ripening them and of checking the spread of oïdium ; but the grapes should, nevertheless, in such seasons also be sufficiently shaded by the leaves to prevent the rays of the sun from falling on them directly, both for the purpose of preventing them from being directly damaged through getting sun-scorched, or indirectly (in case of wine grapes not intended for the production of sweet wines) through the constituents of the berries undergoing chemical changes which unfavourably affect the quality of the resulting wine.

SUCKERING.

Suckering consists in the removal of such shoots as bear no fruit and are not required for the future shaping of the vine. With certain systems of training the vine, *e.g.* on poles or trellises, this work can be undertaken with advantage as the removal of a portion of the shoots will strengthen the remainder considerably, but, in the case of bush trained vines, suckering is very seldom systematically practised except in regard to the removal of "watershoots," a term applied to such suckers as grow out of the main stem either from below the surface of the ground or close to the ground.

In districts infected with the calandra insect, the suckers are purposely left on the vines to serve gradually, as required, for the purpose of making leaf balls, which are placed in the forks of the stems and in which the insects take shelter and are destroyed by burning.

There are, besides, two reasons why suckering, which in most

European works on viticulture is considered an important and necessary operation, is not systematically practised at the Cape.

Firstly, our grapes require more shade in this sunny climate, a requirement to which the leaves of the non-bearing shoots greatly contribute; and secondly, the non-bearing shoots assist the others in standing up against our heavy wind-storms; if only the bearing shoots are left right from the start, they shoot up very rapidly, and, through being situated comparatively far apart, have no mutual resistance against the wind, in consequence of which they are easily blown off.

IRRIGATION.

On the great majority of soils of the Western Province, in districts with a rainfall of over 20 inches, vineyard irrigation is unnecessary, and cultivation, which means the preservation of the natural moisture of the land, should take its place. In districts with a rainfall of under 20 inches there are many situations in which irrigation is equally unnecessary; the character of the land and the growth of the vines will decide the question in such districts and also in the exceptional cases of doubt in districts with a higher rainfall.

The irrigation of vineyards, it must be remembered, does not quite bear the same relation to the crop as the irrigation of fruit orchards. In the case of orchards the object generally is to get the best sized fruit irrespective of quality, whereas in the case of grapes intended for wine making quality should be the first consideration, and the irrigation of a vineyard that does not really require more moisture for the development of the grapes is not likely to do the quality of the wine any good. In many instances vineyards are irrigated where it is really not necessary, and in not a few cases where irrigation is beneficial it is altogether overdone.

The result of over-irrigation, especially where there is a clay subsoil, is that the lower roots of the vine are checked in their development through excessive moisture and the growth of the upper roots is encouraged. If such a system of irrigation be continued for a number of years and the irrigation water should happen to fail in a dry season it will be attended with disastrous results to that year's crop, as the greater portion will be sure to wither away owing to the bottom roots not having struck down to a sufficient depth to gather the necessary moisture to keep the vine in a healthy condition.

In districts not yet infected with phylloxera this fact has another significance, namely, that over-irrigated vines, through having their root system near the surface, will be much sooner destroyed by the pest than unirrigated or sparingly irrigated vines with a deep root system.

In cases where irrigation has to be resorted to, two or three soaking irrigations, when the summer is well advanced, with intervals of about a month, are ample provided the surface is well stirred up either by a horse-hoe, hand-hoe or spade a couple of days after the irrigation, as soon as the crust is dry enough for the work. If the irrigation be not followed up by such cultivation the surface will get baked and crack open, and a great part of the moisture of the land will escape through the fissures thus formed.

DRAINING.

The advantages of draining are manifold, but only one will be mentioned, namely, that air in the soil is known to have quite as much to do with successful plant growth as moisture, and no system of manuring will render a soil fertile that is waterlogged and has no room for air in it.

The systematic draining of a vineyard wherever the nature of the land requires it, is as important an operation as cultivation and manuring. Vine roots penetrate to a considerable depth, and drains, to be effective, should be at least four feet deep.

One of the difficulties connected with open drains is that the sides will in many cases keep falling in and obstruct the passage of the water. In vine cuttings we have an excellent material ready to hand for constructing covered drains, and if well put down they will keep a drain in good working order for quite 3 years, by which time the drain will likely become choked up and require re-filling. Such drains are made in the following way: After the trench has been dug out with a long draining tool, broad on top and narrowing down to about 4 inches, a layer of vine cuttings about 2 ft. thick is tramped down in the bottom; a layer of grass or straw is put on the top of the cuttings to prevent the ground from sifting through, and the drain is covered up.

Such drains are easily and expeditiously constructed, and a series of them with outflows in the main storm water furrows will drain wet land pretty thoroughly.

STOCK FARMING.

Chewing the Cud.

The food is received into the first stomach, passes into the second, and finally into the fourth, where it is digested.

The simple facts are these:

The food is hastily swallowed and goes into the rumen, or large sac, which has a capacity of several bushels. Connected with the rumen, or large sac, is the recticulum, commonly called the honeycomb, on account of its cellular lining, and this is a mere adjunct of the rumen, and appears to serve the purpose mostly of a reservoir of water, by which the food is moistened and reduced to a fine pulp between the leaves of the next compartment, called the omasum or manyplies; so-called because of the numerous leaves with which it is furnished and between which the food is ground into a soft semi-fluid pulp. From this the food passes into the abomasum, or true digestion stomach, in which it is partly dissolved by the gastric fluid here secreted.

Now let us go back to the food hastily swallowed by a ruminating animal. Right at the junction of the three first divisions, is a curious bit of machinery called the œsophageal groove. This is a small sac or tube a few inches in length, which connects the first and second divisions of the stomach with the third. This groove has a slit in it through which the hastily eaten food—moistened by the water in the reticulum—is forced by a contraction of the stomach, easily visible when the cow is ruminating, into this small canal, and by a process of regurgitation is carried to the mouth. This small quantity of food is the cud. It is simply a wad of food forced, as described, into the mouth, where it is chewed in leisure, and with evident comfort and pleasure, by the healthy animal. Being reduced to a semi-fluid condition, it is swallowed and goes to the omasum or manyplies on account of its numerous leaves between which it is macerated into a fluid, which then goes to the fourth part of the stomach, where it is mixed with the gastric fluid, the solvent of the food, and then becomes nutriment, completely, when acted on by the bile in the duodenum.—PROFESSOR HENRY STEWART, in *Forest and Stream.*

MISCELLANEOUS.

The Queenstown Farmers' Association.

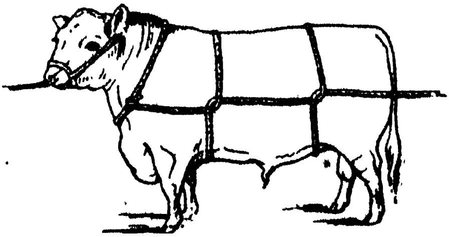
SHEEP SHEARING.

At the meeting of the Queenstown Farmers' Association on Saturday, the 24th November, the Hon. Thomas Bailey said :—

"I beg leave to give notice that at the next meeting of this Farmers' Association I shall move that all Farmers' Associations be requested to assist in getting a Bill passed through our Parliament compelling farmers to allow their sheep to be shorn only once in twelve months, as in the creation of the sheep it was never intended that they should be shorn more than once a year, which allows the yolk to mature, and so preserves the skin. In shearing twice a year the yolk never matures, hence the skin becomes dry and parched, creating what is called scab, which predominates more in this country than in any other part of the world, this being the only part of the world where sheep are shorn twice a year. At your own showing at last meeting sheep shorn once a year carry fifteen per cent. more wool than when shorn twice a year. One should also consider the misery the poor animals suffer through being treated in this manner."

How to Throw a Bull.

Put a halter on. Take a sound ordinary cart rope, make a loop at one end and pass it over the head, and let it rest close around the neck, low down, like a collar; bring the rope to the near side, pass it over the back just behind the shoulders, bring it underneath the chest, and pass it under and then above the rope, so as to make a loop around the chest; carry the rope back, pass it over the loins, and bring it underneath the belly, close to the flanks; make another loop as before, and carry the rope straight behind the animal, and tighten up the loops, one close to the elbows, the other close to the hind flanks. All being ready, instruct the man who holds the halter shank to pull forward, and at the same time the men who have hold of the loose end of the rope to pull straight backward, and down the animal goes, generally without a struggle. Keep the head down and the rope firm, and, as a rule, the animal lies quietly until such time it is desired he should get up, when slacken the rope and up he gets, none the worse for the casting. The heaviest bull may be cast in this way, but of course no one would think of casting an in-calf cow or heifer either in this or any other way.—*Aberdeen-Angus Association.*



GOVERNMENT NOTICES.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM BASUTOLAND.

By command of His Excellency the Governor, the following Proclamation No. 164, 1901, was published in the Government Gazette of October 29th, 1901 :-

Whereas by Proclamation No. 100, bearing date the 4th day of June, 1901, I did, by reason of the existence of the disease amongst cattle known as Rinderpest in the Territory of Basutoland, prohibit the introduction of horned cattle from the said Territory into this Colony :

And whereas the said disease has spread to the portions of this Colony which adjoin the said Territory, thus rendering it unnecessary to longer maintain the prohibition imposed by the said Proclamation :

Now, therefore, under and by virtue of the powers and authorities in me vested, I do hereby proclaim, declare and make known that from and after the date hereof the prohibition upon the introduction of horned cattle from Basutoland into this Colony shall be removed : the said Proclamation No. 100 of 1901 being hereby repealed accordingly.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM ORANGE RIVER COLON AND THE TRANSVAAL.

By command of His Excellency the Governor, the following Proclamation No. 139, 1901, was published in the Government Gazette of August 16th, 1901 :—

Under and by virtue of the powers vested in me by the "Animal Diseases Act," No. 27 of 1893, and by the "Animals Diseases Rinderpest Amendment Act," No. 2 of 1897, I do hereby proclaim, declare and make known that it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced into any part of this Colony from the Orange River Colony and the Transvaal, save and except such cattle as may be required to be introduced by the Government for the purpose of supplying Bile or Serum for inoculation against Rinderpest :

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed :

And I do hereby further declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

Proclamation No. 217, bearing date the 29th day of October, 1900, together with the regulations issued thereunder, is thereby repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined Regulation for checking the spread of the infection is republished.

REGULATION ISSUED UNDER PROCLAMATION No. 30, DATED 20TH JANUARY, 1899.

Whenever under the provisions of Sections 11 and 12 of Act No. 27 of 1893, any area is declared or proclaimed to be an area infected with Rinderpest, it shall not be lawful for any person, animal, animal produce, article or thing, who or which may, in the opinion of the Magistrate of the District in which such area is situated, be liable to convey infection of Rinderpest, to leave or to be removed therefrom.

Inoculation Against Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of the Colony, it is desirable to inform stock-owners of the intentions of the Government as to dealing with the outbreak should it unfortunately become general in the Colony, and to advise stock-owners as to the best course to follow.

The Government propose that, as a general rule, cattle-owners themselves should perform the inoculation. Glycerinated Bile will be used, though circumstances may arise where it will be preferable to use Serum.

Bile Stations will be established in suitable places as necessity arises in localities where farmers have agreed to contribute the required proportion, say 5 per cent., of their cattle for production of the bile. It must be clearly understood that unless farmers are prepared to thus contribute the necessary cattle, it will be impossible for them to have the benefit of a Bile Station.

Glycerinated Bile will be issued free to contributors in proportion to the number of cattle contributed to a Bile Station. To non-contributors a fair charge will be made for bile if any be available for issue.

Serum will be charged for at the rate of £1 per bottle of ten doses.

A limited supply of Glycerinated Bile to meet emergencies will, for a time, be available, free of charge, from the Bile Station which has been established under arrangements with the Imperial Military authorities near Aliwal North.

As occasion requires, Demonstrators will be sent to instruct farmers in the method of inoculation, free of charge. They will, as a rule, inoculate only enough cattle to show how it is to be done, leaving the owner to continue the work. The Government will supply syringes on application to the Resident Magistrate, or to the Demonstrators at the following charges:—20 cc. capacity, 20s; 10 cc. capacity, 15s. This payment may be recovered on return of the syringe to the Magistrate, in good order.

After the experience gained during the outbreak of 1896-1898, the Colonial Veterinary Surgeon wrote* as follows:—

"The method of inoculation which I would recommend in future sporadic outbreaks of the disease is briefly as follows:—

"*Infected Herds.*—These should be inoculated at once with either serum or glycerinated bile; every animal which indicates infection by a rise of temperature should receive a large dose of not less than 100 cc. of serum, or 30 cc. of glycerinated bile; the latter should, by preference, be injected into the jugular vein, so as to secure its immediate action. Then from eight to twelve days after, all the animals in the herd

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* See *Agricultural Journal*, June 8, 1899, in which will be found a full consideration of the different methods of inoculation.

" which give no indication of being infected with the disease, or fever temperature,
" should receive an injection of pure bile ; not less than 10 cc., and for large animals
" 20 cc. This will confer a lasting immunity sufficient for all practical purposes.

" *Clean Herds.*—When it is decided to inoculate a clean herd, which is in danger of
" becoming infected through its proximity to diseased cattle I would recommend that
" the animals composing the herd should be inoculated first with 20 cc. of glycerinated
" bile, and to follow this inoculation in from eight to twelve days with an injection of
" from 10 to 20 cc. of pure bile. This will confer a strong and lasting immunity on the
' animals in the herd, and will be free from risk arising from the inoculation or of
introducing the disease.

" *Use of Pure Bile.*—Pure fresh bile should not be used in an infected herd, if any
" of the other inoculating materials can be obtained, as it tends to intensify the
" character of the disease in those already infected, and its immunising effect is too
" slowly developed to protect the healthy cattle against infection, if they are left in
" contact with those already sick. If no other means are available, however, the
" temperatures of the whole of the cattle in the infected herd should be carefully taken
" by the clinical thermometer, and only those which register a normal temperature
" should be inoculated with pure bile, the others should be separated from the inoculated
" lot at once, and carefully tended. If glycerine can be obtained, the spare bile should
" be mixed with it in the proper proportions—one part of glycerine to two parts of
" bile. This mixture, after standing forty-eight hours, may be injected into the affected
" animals in large doses, not only with safety, but with marked benefit.

" *Preparing the Bile.*—The bile should be taken from an affected animal immedi-
" ately after death, or from one which is killed in the last stage of collapse.

" Biles of all shades of colour—except those which are red from the presence of
" blood—may be used, so long as they are clear and free from a putrid smell. Thin
" light yellow biles should also be rejected.

" All the galls extracted at one time should be mixed together, after standing sepa-
" rately for twelve to eighteen hours, so as to render them uniform in strength and
" immunising properties. Pure bile should be used on the second day after being
" drawn, unless it is kept in an ice chest, when it may be kept sweet much longer. But
" if pure bile is used as a second inoculation only, as above directed, it is not desirable
" to keep it longer than twenty-four hours.

" Glycerinated bile is made by adding one part of glycerine to two parts of bile, stir
"the mixture well, then mix all the biles taken at one time, and allow them to stand
" for eight days. But if there is urgency, the glycerinated bile may be used forty-eight
" hours after it is mixed.

" I would strongly recommend that in every outbreak of the disease that occurs,
" every drop of suitable bile, obtained from the animals which die, should be mixed
" with glycerine in proper proportions, two parts of the bile to one of glycerine, so that
" it may be preserved and made available for the inoculation of infected herds, and also
" for the first inoculation of clean herds which may be considered in danger. Pure
" bile for the second inoculation of clean herds can always be obtained when the
" disease appears in any locality, which would be the only reason for inoculating clean
" herds in the immediate vicinity."

Taking the Bile.—To remove the bile the animal must be laid on its left side, the skin and flesh on the right side immediately behind the last rib being cut through ; the ribs being raised, the gall bladder will become visible. The gall bladder should be then punctured with a small knife and the gall allowed to escape into a wide-mouthed bottle. If wide-mouthed bottles are not available then ordinary whisky bottles may be used with an *enamelled* funnel, which can be procured at any country store. Every precaution must be taken that the operation is performed in a thoroughly clean manner, the hands of the operator and all knives, &c., being thoroughly cleansed before use.

Inoculating.—After having secured the animal to be operated upon, the necessary dose of bile is injected under the skin of the dewlap by means of a Hypodermic Syringe, care being taken that the point of the needle is not inserted into the flesh, but between the skin and flesh.

Symptoms of Rinderpest.

The Outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined description of the symptoms of Rinderpest is hereby published:—

The early symptoms of Rinderpest are a rise of internal temperature to 106 or 107° Fahr.; the animal stands with its head hanging down, ears drawn back and coat staring; it refuses all food and occasionally shivers. A mucous discharge flows from the eyes and nostrils; the extremities are cold, and the breathing is laboured and frequently accompanied with moaning. The inner part of the upper lip and roof of the mouth and all visible mucous membranes are reddened, and covered with an eruption of minute pimples, and later with a branlike exudation. The bowels are occasionally constipated, but in most cases diarrhœa sets in, the evacuations being slimy and very frequently of a dirty yellow colour. The prostration of strength is great, the animal staggering when made to move. In milch cows the secretion of milk is rapidly diminished, and soon ceases altogether. The disease usually ends fatally in from six to ten days.

It is generally believed that the infection is produced through the respiratory organs; from there the contagion becomes generalised. The contagion exists in the secretions and excretions, urine, saliva, mucous secretions of the nose, mouth and eyes, in the sweat, expired air, blood, and in all the tissues. It may be conveyed directly by the diseased animals, or indirectly by the dung, the bedding, the earth, hides, wool, meat, clothing, wagons or vessels, by people, dogs, sheep and chickens, &c. Contagion takes place only through short distances. When the weather is dry this is reduced to its minimum (about 27 yards), and the progress of the disease may be stopped by a ditch separating the diseased from the healthy animals.

In order to detect the earliest symptoms of Rinderpest, owners of horned cattle are warned of the urgent necessity for keeping a constant and close watch upon their stock. Any suspicious cases should be immediately reported to the nearest Resident Magistrate, Field-cornet or Police Officer, and the sick animal kept separate till an inspection is made. Stock should be carefully examined daily by a responsible person, more particularly for any symptoms resembling those above described.

Farmers' Apprentices.

As inquiries are from time to time received from young men from abroad as to where they may serve apprenticeship or gain practical experience of farming in this Colony, before starting on their own account, the Secretary for Agriculture invites Farmers who are willing to receive young men of good character, for this purpose, to register their names with the Under Secretary for Agriculture, stating the class of farming they do, how many young men they are prepared to take, and for what period they would enter into an agreement.

It is not probable that these young men will be in a position to give more than their free services in return for the experience they will gain; that is, they will not be able to pay any fee; and they will look to receiving free board and lodging in return for their services.

It is to Farmers, therefore, who are willing to grant such young men free board and lodging in return for services rendered, that this application is especially addressed.

With reference to the above notice to Farmers, the Secretary for Agriculture now invites young men who are willing to engage themselves as Farmers' Apprentices in Cape Colony to register their names with the Under Secretary for Agriculture, Cape Town. The apprentice will gain experience in farming in South Africa, and have an opportunity for spying out the land before starting on his own farm. To the new comer from another country this is essential, for he has much to learn and unlearn.

Many applications for such Apprentices have been received from Farmers in the Colony. It will be noted that the Apprentice will neither receive wages, nor pay a fee. He will get free board and lodging in return for his services, and at the same time acquire the experience he is in need of.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October, 1900:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned.

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

- (*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and
- (*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie

Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B' hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung-sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz:—

Number and general description of Cattle ....
Owner's name and address ....
In charge of..
Place to which Cattle are being sent..................................
(Signature)..
(Address)..

Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature.
(Add

Date.........

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle ....
Owner's name and address ....
In charge of..
Place to which Cattle are being sent..................................
(Inspector's signature)..
(Address)..

Date..................

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

Destruction of Wild Carnivora.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*)	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Seed Wheat.

A small consignment of "Red Egyptian" Seed Wheat has been imported by the Government for experimental sowing with a view to ascertaining its suitability as a rust-resistant wheat as well as its milling qualities.

This wheat will be distributed in lots not exceeding 100 lb. to any one person, upon deposit of a sum at the rate of 10s. per 100 lb., and the amount so paid will be refunded to all those applicants who furnish a full report, upon a printed form which will be supplied to them, showing the result of the trial.

Applications should be addressed to the Under Secretary for Agriculture, Cape Town, and must be accompanied by a remittance (by P.O. Order, Postal Note, Bank Draft or Cash) for the amount of the deposit.

As the consignment is a small one, early application should be made.

Tobacco Seed.

A small consignment of the following varieties of Tobacco Seed, viz.:—White Burley, Havana, Yellow Oronoko, Virginia "One Sucker," Virginia Pryor, Blue Pryor, Connecticut Seed Leaf, and Maryland, have been obtained from America by the Agricultural Department. Sumatra, Long Leaf Gooch and St. Felix are shortly expected.

Applications, accompanied by the deposit of 5s., should be addressed to the Under Secretary for Agriculture, Cape Town; and will be dealt with in order of receipt.

The seed will be distributed in lots not exceeding 3 oz. each of any three of the above-mentioned varieties upon deposit of the sum of 5s. by each applicant, which amount will be refunded by the Government to all applicants who furnish a report in due course, giving full particulars as to the mode of cultivation adopted and the results obtained.

LONDON WOOL SALES.

Sales and Prices of Cape Wools.

Continued from page 716, vol. XIX.

The sixth series for the year 1901 began on November 26th, and the following is from Messrs. Stables, Straker & Co's Wool Circular and Report.

The following abbreviations are used to designate the different conditions and clips of wool:—Grs. stands for grease wool; Flc., fleece-washed; Scd., scoured; com., combing wool; Cl., clothing; Lam., lambs'; Dam., damaged; Hgt., t; Blk., black; Sn.-wt., snow-white; Xbd., cross-bred; Lks., locks; Bel., s; Pcs, pieces. Slip, wool off skins.

Not having the necessary woodcuts we give the various bale marks, such marks are described in letterpress, thus Double triangle, crossed arrows, &c.

CAPE. Nov. 26.

Dunottar, Dunvegan, Carisbrook, &c.

Mark.	Description & Ship.	Bales.	s.	d.
H&Co. W <F> London	Grs.com. ..	4	0	6¾
	,, ,, ..	6	0	6½
	,, ,, ..	2	0	6¼
	mix. ..	7	0	5¾
	slip.longsup. ..	2	0	8½
TK&F London	slip.longsup. ..	1	1	0
	,, ,, ..	16	0	11½
	,, ..	5	0	10½
	,, -¦- long ..	5	0	9
	,, ,, ,, ..	1	not sold	
	,, ,, ..	1	0	8
Paarl/EB	snow-wt.ext.sup.	25	1	5½
	,, ..	1	1	2½
CJM/WI	Grs.com. ..	15	0	5½
Paarl/M Waverley Mills CJM	sup.snow-wt.ext.	6	not sold	
	,, ,, ..	1	1	1½
	,, ,, ext.	7	1	4½
	,, ,, ..	1	1	2½
Caledon CJM FL	Grs.sup.com. ..	8	not sold	
	,, ,, ,, ..	8	0	6¾
	,, ,, ,, ..	14	0	6¼
HBC C. Adams Junr Springfield	Grs.sup.com. ..	31	not sold	
	,, ..	1	0	4½
	,, ..	2	0	5½
	,, lam. ..	1	0	6

ALGOA BAY.

Galeka.

Mark.	Description & Ship.	Bales.	s.	d.
BB	Grs.sup.com. ..	81	0	5½
	,, ,, ,, ..	33	not sold	
	,, ,, ,, ..	31	0	5½
	,, ,, ..	71	not sold	
	,, ,, ..	8	0	4¾
	,, dam ..	51	0	5
[EM]	,, sup. ..	2	not sold	

EAST LONDON.

Briton, Lismore, Galeka.

Mark.	Description & Ship.	Bales.	s.	d.
FWS Toise	sup.snow-wt. ..	36	1	0½
	,, ,, ..	35	1	0
	,, ,, ..	4	0	11½
EL Crossed Swords	,, ,, ..	20	1	1
	Scd.blk. ..	16	1	2½
	,, grey ..	6	0	10½
STU	Grs.sup. ..	20	0	6
	,, ,, ..	6	0	5¾
	,, ,, ..	4	0	5½
EL Six Birds in reversed triangle	Flc.wsh.sup. ..	11	0	7½
	,, ,, ,, ..	27	not sold	

Guelph, Raglan, Norham.

Mark.	Description & Ship.	Bales.	s.	d.
GO	Grs.sup.com. ..	15	0	5¾
	„ „ ..	2	0	5
	„ „ com.dam	2	0	5¾
Crossed Arrows	Scd.sup. ..	43	1	1¼
	„ „ ..	38	not sold	
	„ „ ..	6	1	1
RT/Baza	„ „ ..	40	1	1
	„ „ ..	12	1	0
FWS „	„ „ ..	25	1	0¼
	„ „ ..	6	not sold	

CAPE. Nov. 27.

Dunottar, Carisbrook.

at Mossel

Mark.	Description & Ship.	Bales.	s.	d.
PV&Co. Anchor	Grs.sup ..	8	0	7¼
	„ ..	4	0	6¼
	„ ..	4	0	5½
	„ lam. ..	7	0	6
	„ de'd ..	1	0	8¼
	„ lks. ..	1	0	4½
	„ „ ..	1	0	3¾
	„ C C ..	1	0	3¾
	„ „ „ ..	1	0	2¼
Anchor	„ sup ..	6	0	5¼
	„ „ ..	12	0	5¼
HV&Co. MB (New Clip)	Grs.sup.com. ..	26	0	6¼
	„ „ „ ..	15	0	5¼
	„ mix. ..	1	0	5½
	„ lam. ..	1	0	5½
	„ lks. ..	2	0	2½
	„ de'd ..	1	0	8½
	„ coarse ..	8	0	8½
Paarl [W]	ext.sup.snow-wt	17	1	5
	„ „ „	8	1	4½
„ MJ	„ „ „	6	1	4
„ JP	„ „ „	10	1	4
„ G	„ „ „	22	1	4
	„ „ „	17	1	3
	„ „ „	12	1	2
„ [S]	„ „ „	18	not sold	

Briton, Norman, Galeka, &c.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl/HR	ext.sup.snow-wt	5	1	6
„ □	„ „ „	14	1	5
	„ „ „	7	not sold	
	„ „ „	10	1	4
„ [S]L	Scd. ..	1	1	0
„ „ &c.	ext.sup.snow-wt	19	not sold	
„ H	„ „ „	14	1	5
FWH/Tylden	Grs.sup. ..	11	0	6¼
TOS	sup.snow-wt. ..	5	1	0¼
Phœnix Wks.	„ „ ..	6	0	11½
	Scd. ..	1	0	9
	„ sup.crs.-wt.	2	not sold	
	„ „ C C	2	0	7½
„ M/CT	sup.snow-wt. ..	14	not sold	

ALGOA BAY.

Galician, Briton, Saxon.

Mark.	Description & Ship.	Bales.	s.	d.
NN	Grs.sup.com...	18	0	6¼
	„ „ lam. ..	3	0	5¼
	„ „ com. ..	6	0	5
	„ „ „ ..	10	0	4½
DUN	ext.sup.snow-wt	15	not sold	
OAT	„ „ „	11	0	11¼
WW/L	Scd. „ ..	60	not sold	

Dunvegan, Goth, Buluwayo.

Mark.	Description & Ship.	Bales.	s.	d.
<116>	sup.snow-wt. ..	103	not sold	
	„ „ dam	8	0	10½
ESG	Grs.xbd.sup.com	88	0	7¼
	„ „ „ „	46	not sold	
VMK	„ sup. ..	88	not sold	
AHW	„ sup.com. ..	77	not sold	
	„ „ ..	2	0	4¼
	„ „ com.dam	1	0	5¾
MG	Scd. ..	5	1	0
	„ ..	1	0	11

EAST LONDON.

Raglan Castle.

Mark.	Description & Ship.	Bales.	s.	d.
LC B	Grs.sup.com. ..	27	not sold	
	„ „ „ ..	1	0	5
	„ „ „ dam	8	0	6

EAST LONDON. Nov. 28

Guelph, Galician, Dunolly, &c.

Mark.	Description & Ship.	Bales.	s.	d.
XL	Grs.sup.com.ext.	7	0	7¾
SXM	„ „ „ ..	8	0	6
MAL/Cathcart	„ „ „ ..	17	not sold	
BIN	... „ „ „ ..	1	0	5
GST	„ „ ..	6	0	6
	„ „ ..	10	0	5¾
	„ „ ..	8	not sold	
IVY	„ „ ..	12	0	6
	„ „ ..	16	not sold	
	„ „ ..	16	0	5¾
Crossed Arrows	Scd.sup. ..	18	1	1½
	„ „ ..	88	1	1
	„ „ ..	87	1	1
	„ „ ..	7	1	1¼
	„ „ ..	88	1	0¾
	Fl.wsh.sup ..	84	0	7
Various	... .	14	not sold	

Saxon, Norman.

Mark.	Description & Ship.	Bales.	s.	d.
(PB)RA	Grs.com. ..	16	0	5½
	„ „ ..	41	0	5
RT/Baza	Scd.sup. ..	26	1	0¼
	„ „ ..	26	not sold	

Mark.	Description & Ship.	Bales.	s.	d.
WBS/Baza	Scd.sup.	10	not sold	
	„ „	13	1	0
	„ „	1	0	10
WWS „	„ „	15	not sold	
	„ „	1	0	10
Baza	„ „	37	not sold	
Lunda	„ „	2	0	10½

Galaka.

M/WL	Grs.sup.com.	19	0	6¼
M/FA	„ „ „	18	0	5¼
M	„ „ „	4	0	5½
	„ „ light	18	0	4¾
	„ „ „	1	0	3½
M/HD	„ „ „	43	0	5½
MB/MF	„ „ „	6	0	5
	„ „ „	38	0	4¾
S/MB/V	„ „ „	28	0	5¼
	„ „ „	2	0	5½
MB/MAT	„ com.	4	0	5¾
	„ sup.light	22	0	5¼
L/MB/V	„ com.	3	0	5½

Dunottar, Norman.

Yukon	Scd.sup.	13	1	0
	„ „	14	0	11
Bolo	„ „	26	1	0
Bomvana	„ „	2	0	11
	„ „	1	0	9½
	„ „ mix	1	0	9
Bolo	„ „	30	1	0½
	„ „	5	1	0
Yukon	„ „	11	1	0
	„ „	24	0	11½

APE.

Kinfauns, Dunottar, Carisbrook, &c.

Paarl PDV	Scd.com.ext.sup.	25	1	5½
	„ „ sup.	3	1	4
	„ sup.	3	1	3½
	„ „ L	1	1	1
„ [SM]	„ sn.-wt.ext.sup.	9	1	3
	„ „ „ „	1	1	1
„ [SA]	„ „ „ „	10	1	3
	„ „ sup.	2	1	1
„ CJM	„ „ ext.sup.	15	not sold	
	„ „ sup.	1	1	1¼
	„ sup. L	2	0	11
Waverley Mills CJM	„ sn.-wt.ext.sup	26	1	5
	„ „ 2nd	2	1	1
DE	wsh.com.sup.	10	0	11½
Caledon CJM/FL	Grs. „ ext.sup.	18	0	7½
	„ „ „ „	18	0	7

Mark.	Description & Ship.	Bales.	s.	d.

CAPE. Nov. 30.

Norham Castle, Carisbrook, Braemar.

MLN (New Clip)	Grs.sup.com.	15	0	7
	„ „ „	5	0	6¼
	„ pcs.	2	0	4½
CA (New Clip)	„ sup.com.	13	0	6¼
	„ „ „	8	0	5¾
	„ „ lam.	2	0	5¾
	„ lks.	1	0	3½
WHJ..1901	„ sup.com.	12	not sold	
CJR Caledon „	Flc.wsh. „ sup.	11	0	10
	„ „ lks.	1	0	5½
DM (New Clip)	Grs.sup.com.	24	0	7¼
	„ „ lks.	2	0	4½
OP (New Clip)	„ „ com.	4	0	7
	„ „ „	27	0	6¾
	„ „ „	4	0	6¼
PMP (New Clip)	„ „ „	10	not sold	
	„ „ „	9	0	7
	„ „ „	15	not sold	
	„ „ „	15	0	6½
	„ „ „	1	0	6
<TK&F>London	slip.long +	1	0	2

ALGOA BAY.

Dunottar, Galeka.

JP H	sn.-wt.sup.	89	1	1½
	„	7	0	11½
	„ coarse	1	0	10
	Scd.	1	0	8
	„ blk.	1	0	7
	„ grey	1	0	6

Dunvegan, Kinfauns.

Hopley	Grs.sup.	26	0	5½
	„ „	26	0	5
AC	„ com.	20	0	5¾
	„ „	7	0	5½
	„ „	9	not sold	

EAST LONDON.

Galeka.

JH	Grs.sup.com.	20	0	8
	„ „	14	not sold	
JRB	„ com.	12	0	6
	„ „	8	0	5¼
	„ pcs.	2	0	4½
J Webb	Grs.sup.	16	0	5¾
„ R Webb	„ „ com.	1	0	6
SD	„ „ „	6	0	6¾
	„ „ „	83	0	6¼
	„ mix	1	0	4½
GHB	„ sup.	21	not sold	
	„ „ com.	11	0	5¾
	„ pcs.	3	0	3½

Guelph, Briton, Dunolly, &c.

Mark.	Description & Ship.	Bales.	s.	d.
R/Toise	Scd.sup.	19	1	0½
	,, ,,	58	not sold	
TAT/H	Grs. ,, com.	7	0	5½
,, E	,, ,, ,,	7	0	6¼
,, L	,, ,, ,,	9	0	5¾
S(K)W	sn.-wt.	12	1	1
LS	Scd.sup.	43	not sold	
	,, ,,	11	0	11

Galeka, Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
EL Six Birds in reversed triangle	Fls.wsh.sup.	28	0	7
	,, ,, ,,	23	not sold	
JD ,,	,, ,, ,,	3	0	7
	,, ,, ,,	8	not sold	
EL Crossed Swords	sn.wt.sup.	26	1	1½
	,, ,,	19	1	1
	,, ,,	17	1	0½
	,, ,,	19	1	0
	,,	3	1	0

CAPE. Dec. 2.

Braemar, Norham, Carisbrook, &c.

Mark.	Description & Ship.	Bales.	s.	d.
JP	ext.sup.sn.-wt.	13	not sold	
JPO	,, ,, ,,	3	not sold	
	,, ,, ,,	4	1	3½
BBB	Flc.wsh.sup	6	0	9½
OBO New Clip)	Grs.sup.com.caledon	20	0	7½
	,, ,, ,, ,,	20	0	7
	,, ,, ,, ,,	5	0	6½
Paarl/FB	ext sup.sn.-wt.	6	not sold	
,, SB	,, ,, ,,	4	not sold	
	,, ,, ,,	1	0	11½
,, A	,, ,, ,,	20	1	6
Various		40	not sold	

ALGOA BAY.

Galician, Galeka, Tantallon.

Mark.	Description & Ship.	Bales.	s.	d.
PAT	sup.sn.-wt.	28	1	1½
	,, ,,	23	1	1
TOR	,, ,,	8	not sold	
<H>FB	Scd.fine blk.	14	not sold	

EAST LONDON.

Galeka, Briton, Goorkha.

Mark.	Description & Ship.	Bales.	s.	d
Crossed Arrows	F W sup.	32	0	7
	,, ,, ,,	1	0	6½
	Scd.sup.	16	1	1½
	,, ,,	50	1	1
Baza	,, ,,	38	1	0
	,, ,,	22	0	11½
	,, ,,	2	0	11
Lunda	,, ,,	6	0	11
(PB)SOU	Grs.sup.	11	not sold	
DB	,, ,,	8	0	4½

Norham, Norman, Lismore.

Mark.	Description & Ship.	Bales.	s.	d
JC/K	Grs.sup.	8	not sold	
SUP	,, ,,	13	0	4½
PAT	,, ,,	7	not sold	
	,, ,,	1	0	5
ELT	,, com.	23	0	6½
	,, ,,	8	not sold	
	,, ,, dam.	1	0	5½
SCW	Scd.coarse white	2	0	5½

Carisbrook, Dunolly, Raglan, &c.

Mark.	Description & Ship.	Bales.	s.	d
CFB	Grs.sup.com.	18	0	6¾
	,, ,, ,,	7	not sold	
JWK	,, ,,	16	0	6¼
	,, lam.	1	0	5½
WCR	,, sup.com.	2	0	7¼
	,, ,,	18	0	6¾
B	,, ,,	4	0	5½
	,, ,,	8	0	5
BRA	,, ,,	2	0	5¼
HAW	,, ,,	3	0	4¾
HNS	,, ,,	8	0	6¾
	,, ,,	15	0	6½
	,, lam.	2	0	6¼
DRY	,, sup.	10	not sold	
	,, ,,	1	0	5¼
AMB	,, ,,	14	0	5¾
WG	,, ,,	6	0	5¾
Three Legs	,, ,,	7	0	6¾
Q	,, ,,	4	0	5½
	,, ,,	1	0	5
	,, ,,	1	0	4½
Various		2	sundry	

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, 28th December, 1901, as telegraphed by the Civil Commissioners of the places respectively named, and from Natal, is published hereunder.

CENTRE.	A Wheat. per 100 lb.	B. Wheat Flour. per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E Mealie Meal per 100 lb.	F. Barley. per 100 lb.	G. Oats. per 100 lb.	H. Oat-hay. per 100 lb.	J. Potatoes. per bag.	K. Tobacco (Boer Roll.) per lb.	L. Beef. per lb.	M Mutton per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s d	£ s. d.
Aliwal North ..	0 10 0	0 17 0	0 13 0	0 10 6	0 12 0	0 15 0	0 14 0	0 12 0	1 3 0	0 1 0	0 0 10	0 0 10	0 3 6	0 2 6	£18 to £22	12/- to 20/-
Beaufort West .	0 13 0	0 18 0	0 13 6	0 13 0	0 14 0	0 12 0	0 15 0	0 9 0	0 11 0	0 1 0	0 0 8	0 0 6½	0 1 9	0 2 6	18 0 0	1 2 6
Burghersdorp ..	0 7 6	...	..	...	...	...	...	0 7 0	0 8 0	...	0 0 7½	0 0 8	0 2 0	0 2 6	...	...
Cape Town ...	0 10 0	0 12 6	0 11 0	0 8 3	0 10 0	0 9 0	0 11 0	0 9 0	0 7 6	...	0 0 7½	0 0 8½	0 1 3	0 2 0	17 0 0	1 4 0
Clanwilliam ..	0 11 0	0 15 0	0 15 0	0 10 0	0 8 6	...	...	...	1 6 6	...	0 0 6	0 0 6	0 2 0	0 1 6	10 0 0	0 18 0
Colesberg ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cradock ..	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dordrecht ...	0 10 0	0 17 6	0 16 0	0 12 0	0 13 6	0 12 0	0 18 0	...	1 0 0	0 1 9	...	...	0 1 6	0 1 6	...	...
East London ...	0 11 6	0 19 6	0 11 6	0 10 9	0 9 9	0 15 6	0 18 6	0 14 0	1 2 6	0 1 6	0 1 0	0 1 0	0 2 6	0 2 10	..	...
Graaff-Reinet ...	0 17 6	0 18 6	0 14 0	0 12 0	...	0 11 0	0 14 6	0 9 0	0 15 0	0 1 0	0 0 7	0 0 7	...	0 1 9	£12 to £15	20/- to 25/-
Graham's Town ...	...	...	..	..	...	...	...	...	...	..	...	...	...	..	...	...
Kimberley ..	0 13 6	0 17 0	0 15 0	0 12 6	0 12 6	0 12 6	0 15 0	0 15 0	0 18 0	0 1 0	0 1 0	0 0 10	0 2 0	0 2 3	£14 to £18	20/- to 24/-
King Wm's Town	0 13 6	...	...	0 9 3	0 18 0	0 14 6	0 14 6	...	0 11 6	0 1 2	0 0 10	0 0 11	0 2 0	0 2 0	£12 10/- to £23	18/6 to 27/6
Malmesbury ..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

CENTRE.	A. Wheat per 100 lb.	B. Wheat. Flour. per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal. per 100 lb.	F. Barley. per 100 lb.	G. Oats. per 100 lb.	H. Oat-hay. per 100 lb.	J Pota toes per bag	K. Tobacco (Boer Roll.) per lb.	L. Beef. per lb.	M. Mutton. per lb.	N. Fresh Butter. per lb.	O Eggs. per doz.	P Cattle. (Slaughter.)	Q. Sheep. Slaughter.)
	£ s. d.	£ s. d.	£ s. d	£ s d.	£ s. d.	£ s. d	£ s. d.	£ s. d.	£ s. d.	£ s d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d
Mossel Bay ...	0 12 0	0 14 6	0 12 0	0 9 0	...	0 6 0	0 16 0	0 7 6	0 14 0	0 1 0	0 0 9	0 0 9	0 1 6	0 1 0	...	...
Pietermaritzburg, Natal	..	...	...	0 6 0	0 6 0	...	..	0 8 0	0 11 6	0 1 0	0 0 10	0 0 10	0 2 0	0 2 0	25 0 0	1 5 0
Port Alfred	...	...	...	...	...	...	0 7 6	...	...	...	0 0 7	0 0 9	0 3 0	0 2 9	...	..
Port Elizabeth ...	...	...	...	0 0 6	...	0 5 6	...	0 5 6	0 15 0	0 4	...	...	0 2 0	2 6	..	..
Queen's Town ...	0 11 0	0 17 3	0 11 3	0 8 0	0 6 0	0 15 0	0 15 3	0 5 6	0 12 3	0 2 6	0 0 8	0 0 7	0 2 6	0 2 0	...	...
Tarkastad ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Vryburg ...	0 16 0	1 1 0	0 17 6	0 15 0	0 16 0	...	0 13 0	1 1 0	1 10 0	0 1 3	0 1 0	0 1 0	0 4 6	0 3 0	...	1 5 0
Worcester ..	0 19 6	0 18 6	0 12 0	0 11 6	0 12 3	0 8 0	0 2 0	0 5 0	0 10 0	0 1 3	0 0 7	0 0 7	0 1 6	0 1 6	12 0 0	1 2 0

NOTE.—Returns have not been received from the Civil Commissioners of Colesberg, Cradock, Grahamstown, Malmesbury and arkastad.

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I. A. R. I. PUSA

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EDITORIAL NOTES.

At p. 133 we publish the usual Government Notice *re* Game Seasons. It will be observed that handy schedules accompany the notice showing at a glance the animals protected. To meet the constant calls that are made for information during the close season it is intended to reprint the schedules for distribution.

Apropos of the Conference of Horse Breeders at Sydney reported at p. 114 comes a cable from London on 9th inst. to the effect that the Government is offering special inducements to horse-breeders to raise horses for military purposes. We all know the value of the native bred horse and the part he has played in South African wars. He is eagerly sought for by the military authorities and he will ever be in strong demand, as the wool buyers say. Cape horse-breeders, now is your opportunity. An excellent pamphlet by Dr. Hutcheon, Chief Government Veterinary Surgeon, entitled "Military Horses and How to Breed Them," is available at the Agricultural Department and will be forwarded on application.

Talking of horses reminds us that we have another report from Dr. Hutcheon. It is from Chicago. On 7th December he says that after attending the Great International Stock Show there his opinion about the greatness of America has been confirmed. He had a biassed opinion in his mind that England could give the lead in bringing the finest farm stock into the show ring, but he found he was mistaken, for while it cannot be said that America licks creation in that respect as she does in some others, the stock exhibited were placed in the stalls and pens quite up to English form and condition. In heavy draught horses Clydesdales carried everything before them for the first time, as the Percheron heavy draught horse, of which the Show contained the largest exhibit, had always been the most popular. The show was principally made up of Percherons, Dutch, and Belgians, which appeared practically one breed. The light classes included all animals 1,700lbs. and under, and the heavy classes animals over that weight. They were shown first as single animals, then as pairs in harness, as three abreast, four-in-hand and finally six-in-hand teams, and the Clydesdales won every prize except in three abreast. Six teams each containing six large draught horses were driven at a walk and a trot like so many hackneys, and the style and action of the huge animals were little inferior to hackneys. The cattle were equally good, the short-horned, both horned and polled, and Herefords being almost equal to the Royal Society's Show. One imported Galloway bull was sold for £400, the highest price ever paid for a Galloway. He was a champion in Scotland. A shorthorn cow from Aberdeenshire sold for £1,200 for a Canadian firm. The Yankees have the money and the country, so they cannot help "licking all creation." Dr. Hutcheon visited four packing houses each of which was killing about 2,000 cattle, 1,500 sheep, and many thousands of fat hogs daily! The leading firms have their cool chambers into which the carcases are placed pending transference to *their own* refrigerating railway cars, thence to the ship's side, and into cool chambers aboard. From Dr. Hutcheon's general remarks, the American evidently believes that the influence of the Anglo-Saxon race will dominate the world's affairs some day—whether the lead is taken by England or America does not matter a kopeck. There are evidences of America's position in the matter in the extent of her continent and its richness, the dominant character of the people, the rapidity with which all nationalities are assimilated and turned into real Yankees who are proud of their adopted country, and the fact that such things are said to be witnessed nowhere else. Still, Cousin Jonathan, we have an opinion of our own about a future South Africa that, within a decade or two, will begin to touch top mark, for, judging by the love of the country that is manifested in every part of it by those who have weathered its storms and endured its hardships, a power of attraction and assimilation is given to South Africa every whit as potent as the charm that binds Americans in the thraldom of national kinship. It is remarkable that few Colonists from over-sea who have visited South Africa do not wish to return, and those whose lot has been the hardest are not the least eager to endure once more.

One result of the hurly-burly of the last two years in South Africa is that many farmers and others are groping about for remedies for diseases of stock and general disorder in everything, and don't know where to find them. The *Agricultural Journal*, often undelivered through military exigencies, has failed to remind many of them that the Agricultural Department is still intact. We therefore feel bound to announce that it is very much alive and on the alert to ease the lot of the rural population in whose interests it is established, by means of practical advice, personally, through the columns of the *Journal*, and by means of literature that has been prepared by experts. From time to time we call attention to the excellent pamphlets that are issued at a cost barely covering the expense of printing. For instance, Part II. of the Agricultural Miscellanea *Diseases of Stock and Their Treatment* should be in the hands of every farmer. It consists of 163 pages and treats of gall-sickness, derangement of the liver, and disorders of digestion. Blood-pens or diarrhœa in young lambs. Is scab in sheep curable? Preventive mixture for gielziekte in sheep. Acute indigestion of the horse, otherwise known as gorged stomach or stomach staggers. Inflammation in the eyes of domestic animals. Treatment for worms in domestic animals. The use of arsenic as a cure for worms in horses. Abortion in domestic animals. Herkauwsels or hair-balls. Nenta in goats. Meltziekte (anthrax) in Kimberley district. Sore backs on horses. Bluestone as a cure for wire-worms in sheep. Sulphur salt and lime for sheep. Cracked heels in horses. Parasitic lung-sickness in pigs. The so-called measles in pork. Umbilical hernia or rupture. Ox warble fly. Fluke or slak in sheep. Prevention of fluke and slak in sheep. Inoculation for lung-sickness. Foot and mouth disease. Rinderpest. Malarial catarrhal fever. Price sixpence.

QUERIES AND REPLIES.

Daylight Fumigation.

I am told that a Mr. T——r, who is very well known about here and who lives about twelve miles from East London, sent to Cape Town recently for cyanide and is now treating his orange trees under home-made calico covers on the hottest days. He says the hotter the day the better it is for the work, and that his trees are flourishing. I give you this story as it is told to me by some of the members of our fumigating club, and they are anxious for an explanation as to how the trees escape being injured. I am sure I cannot tell unless it is that the gas escapes as quickly as it is generated.

E. C. FLETCHER.

Kei Road, December 25th.

When fumigation against scale insects with hydrocyanic acid gas was first practised twelve to fifteen years ago, oiled tents were used for enclosing the trees, and it was found that in sunlight the treatment severely injured the trees. The injury was then ascribed to the gas, it being supposed that under the action of the sun's rays the gas decomposed and formed compounds more injurious to plant life and less destructive to insect life. When we took up fumigation in this country, we, too, employed oiled covers and found that the trees were injured if the work was done in sunlight; but we noticed also that trees were seriously scorched even in the late afternoon when simply covered and kept so without any generation of gas beneath. Therefore it was recommended that the treatment of trees be confined to cool, dull days, or to the interval between sunset and sunrise. Oiled covers are now discarded in this Colony, and in California as well, but the treatment has continued to be ordinarily applied under the conditions long known to be safe. Our fumigators found out almost at once that trees were not injured under un-oiled covers as under oiled, but few of them ventured to take advantage of the fact except on relatively cool days and then only when the sun was low. Gradually it has become well established that the treatment is quite as successful during sunlight as in darkness so far as the effect on the insects is concerned, and this last year or two there has been some advocacy for sunlight fumigation in opposition to night fumigation. Of late months there has been quite a controversy over the matter in some of the Californian horticultural papers. From a perusal of the communications published in these papers, it appears that many fumigators have been practising fumigation throughout the day. Some claim that there is not the slightest injury to the trees at noon on the hottest of days and that less cyanide is required to kill the insects in sunlight than in darkness; whilst others strongly contend that costly experience has taught them that the trees may get badly scorched. Californian fumigators, as a whole, now use un-oiled covers of light cloth, largely 6½ ounce drill, and under such covers it is quite probable that sunlight fumigation is safe except in very hot weather and around midday of summer days in general. The Mr. T——r alluded to in the above letter, it will be noticed, used covers of calico, which, like drill, does not cause an excessive rise in temperature during the forty minutes that a tree is kept covered. Most fumigation covers in use in the Colony, however, are made of heavy No. 10 duck, and under these sunlight fumigation is not nearly so safe ; yet even with them I have seen successful fumigation done without material injury to the trees in full afternoon sunlight of days when the temperature stood about 75 degrees. Altogether, one needs to be very cautious in treating trees in sunlight, and the wise fumigator will always give preference to cool, dull days, when he can choose his time. If the treatment is done in sunlight the trees should be uncovered promptly at the expiration of forty minutes, the time usually allowed the gas to do its work.

CHAS. P. LOUNSBURY,
Government Entomologist.

Dairying.

I shall feel obliged if you will inform me where I can procure a book that treats of dairy farming and how to feed stabled cows.

P. D. McL.

Pamphlet on dairy farming forwarded to correspondent.—EDITOR.

Stall Feeding for Milch Cows.

To the Editor.

The advantages of "stall feeding" have been so extensively recognised amongst the dairy and stock farmers in England that, with the hope of interesting your readers, I give you herewith the lines upon which the method is usually followed there amongst dairymen especially, and when we remember that London requires more milk than any other city in the world, that its standard of quality is not only a high one, but that it is always maintained (or woo to the unfortunate dairyman), that its distributing machinery is perfect, that the bulk of investors in dairying companies invariably receive 10 per cent. on their investment, that farmers who send their milk from outlying counties also do well, and, lastly, that the retail price in London is but 4d. per quart, it is obvious that in a country where milk ranges from 8d. to 1s. 6d. per quart, some useful knowledge may be gained by a careful study of the methods employed.

A dairy of eighty cows would need but two or three acres to roam in. This economises the land, as about sixty acres, more or less, dependent upon its quality and management, is sufficient to produce the necessary food, including hay; whereas, in the ordinary way of feeding, twice that acreage would not be enough, and the yield of milk would be barely more than half the quantity produced by stall feeding. This is largely adopted in Middlesex, and I will give you the routine of one of its best dairies. During the night the cows are confined in the stalls; at half-past three in the morning a half-bushel of grains is given to each cow; after milking she gets a bushel of turnips (great care is necessary to throw out rotten and withered leaves). About an hour afterwards a truss of the purest, earliest and greenest meadow hay is divided amongst ten cows. These feedings should be made before eight o'clock in the morning, when the animals are turned into the cow yard. At midday they are tied up in their stalls and fed with a half-bushel of grains each. After the afternoon milking they are served with a bushel of turnips, and an hour following with the same allowance of hay as the morning. This course of feeding usually continues throughout the turnip season. During the other months the feed consists of grains, tares, cabbages, and a proportion of second cut meadow hay.

The plan adopted generally in other counties is as follows: At six o'clock every morning each cow is given half a bushel of field beet, carrots, turnips, or cut potatoes. At seven o'clock, the time for milking, give each some hay, and let them feed until they are milked. If hay is refused, give grains, carrots, &c., as it is absolutely necessary the cow should feed whilst being milked. At the conclusion of morning milking, turn the cows into the airing ground, and let there be plenty of fresh water in the troughs; at nine o'clock feed them with three gallons of grains and bran (or pollard) mixed, two parts grains and one bran; when this is eaten, put some hay into the cribs; at twelve o'clock give three gallons of grains and bran as before; at two o'clock, half-bushel of carrots, field beet or turnips; at four o'clock put the cows into the stalls to be milked, feed them on hay; at six o'clock repeat feed of grains and bran. Rack them up at eight o'clock. Twice a week a quart of malt dust at noon is an advantage.

JOHN CHURCHMAN.

Cape Town, 12th January, 1902.

COUNTRY REPORTS.

Bizana.

MAJOR H. SPRIGG, R.M., 2nd Dec.:—The month has been a very wet one, rain falling more or less on, I should think, about 24 days, and it is beginning to be too much for the crops. The outbreak of rinderpest mentioned last month has ceased, 17 cattle dying out of 20 that were attacked; the only cattle that escaped the sickness were those which passed through the former outbreak of 1897-98, which appear to be perfectly immune, and calves sucking immune cows, which appear also to be immune.

Butterworth.

W. BROWNLEE, R.M., 5th Dec.:—Plentiful rains have fallen during the past month, and the pasturage is abundant. Most of the natives have already sown their seed and the prospects of an excellent crop are bright. There is no disease amongst cattle. Horses and small stock are in good condition.

Elliotdale.

W. T. HARGREAVES, R.M., 16th Dec.:—During the past month heavy rains have fallen, registering in all six inches. A heavy hail-storm passed over part of the district, but did no harm beyond knocking a few green peaches off the overcrowded trees. Owing to the continuous rains and the sodden state of the country, the natives, during the earlier portion of the month, were unable to plough, but since then they have displayed unusual activity in ploughing their gardens and sowing mealies, Kaffir corn, pumpkins and tobacco. The crops put in during the earlier part of the season are progressing very favourably. The European inhabitants sowed a lot of Egyptian and Algerian oats, and excellent crops will be reaped at an early date. The fruit is looking very healthy and is plentiful. Last year all the locusts in the district were destroyed by means of fungus, and until the end of the month the district was free from the pest, when large swarms of red-winged locusts came in from Pondoland, and have done considerable damage. I have sent out a man to assist the natives in destroying them with fungus. From some parts of the district the natives report that the locusts are dying after laying their eggs. The pasturage is excellent and stock of all kinds are in good and healthy condition.

Flagstaff.

J. F. C. REIN, R.M., 2nd Dec.:—The cultivation of lands and sowing of cereals was vigorously prosecuted during the past month, which was favourable, the rainfall registered amounting to 6·77 inches. All kinds of stock are looking well. No diseases have been reported.

Libode.

J. Colborn Garner, R.M., 2nd Dec. :—A continuous rain set in at the commencement of last month, and very little fine weather was experienced throughout the whole month. All kinds of stock are looking at their best and there is no disease prevalent amongst them. There is an abundance of veld at present.

Lusikisiki.

R. W. Stanford, R.M., 30th Nov. :—During the month refreshing rains have fallen at frequent intervals and the young crops are in consequence coming on well. Unfortunately large swarms of locusts have appeared on the coast lands, much to the dismay of the agriculturists in that part. Cattle of all descriptions are in good condition and free from diseases of a serious nature.

Nqamakwe.

C. J. Warner, R.M., 4th Dec. :—The past month has been very rainy, and in many parts of the district wheat and forage crops are suffering from the almost continuous misty and cold weather. Some of the mealie crops sown early in the spring have been destroyed by grubs, rendering re-sowing necessary. With the exception of a few quarantined areas there is no lung-sickness in the district, and no fresh outbreaks were reported during the past month. There are no locusts in the district.

Port St. Johns.

W. J. St. J. Turner, R.M., 2nd Dec. :—The month of November has been distinguished by its heavy rainfall, which though welcome in the highlands has somewhat damaged the low-lying crops. A swarm of locusts passed over the district and did slight damage here and here. Locust fungus has been distributed to various intelligent persons, in whose hands I trust it will prove serviceable. Stock of all kinds continue healthy.

Tabankulu.

R. H. Wilson, A.R.M., 30th Nov. :—A great deal of rain has fallen throughout the month, the pasturage is excellent, and stock of all kinds are in splendid condition. The natives have all finished ploughing and there is every indication of a good harvest.

Tsomo.

W. J. G. Thomson, R.M., 2nd Dec. :—During the past month 3 inches of rain were registered at this station; most of the rain fell during the first half of the month. Several very hot dry winds have been felt since and the country is not looking so well. Four cases have been marked out for lung-sickness and one for red-water. The crops are looking well. Stock are in good condition throughout the district.

Willowvale.

M. W. Liefeldt, R.M., 30th Nov.:—I have nothing to add to my report for October, 1901, on this subject.

AGRICULTURE.

Lucerne Growing as Fodder for Stock.

(Continued from page 25.

The Greatest Forage Plant in the World.

Lucerne is the greatest forage plant in the world and far surpasses any other plant; both as a hay crop and as a green crop I know of no plant to compare with it for quantity and quality of hay.

As a green crop, taking the lucerne for 12 months, the only crops that would compare with it for weight would be green barley in the winter (cut three times) and mealies sown thick in the summer. These even would not come up to lucerne in weight; and the quality of the feed would be much inferior. The cost of growing would be very much heavier for the two crops; as the ground would have to be twice ploughed, they would also take very much more water and would cost more to reap.

As compared with plants of a like nature, such as clover, timothy, sainfoin, etc., lucerne hay is 50 per cent. better for feeding purposes, besides standing without re-seeding for a much longer period. Lucerne has been known to stand in this country for over 20 years, while in other countries it has stood without re-seeding for over 100 years.

One of its great advantages is that it has so few enemies, the locust even doing it but little harm.

I will now shortly give the best way of farming it for hay-making, growing for seed and stock farming.

Planting Lucerne with Irrigation.

Lucerne will grow in almost any soil having a good drainage; it seems to do best in light rather than heavy soil.

The land upon which it is intended to grow lucerne should be aid out in level beds not more than 150 yards long by 10 yards broad, with a fall of two feet in the whole length; if more fall is given, the water will run too rapidly over, and if less the top will receive much less water than any other part, causing an uneven crop, which, if intended for hay making, will be found very annoying when curing and riding.

The ground should be well watered and all high spots shovelled down; when sufficiently dry for animals to work on it, it should be ploughed from eight to nine inches deep, harrowed until it is thoroughly pulverised, then sown and harrowed with a light chain harrow. Some farmers then run a light roller over, which packs the ground a little more closely round the seed and also prevents very rapid evaporation of the moisture from the top ground; but if too heavy a roller is used the plant cannot get through. The best way to sow the seed is with a drill; the hand broadcaster also does good work, being adaptable for sowing any quantity per morgen. Sow about ½ inch to ¾ inch deep.

The amount of seed to be sown per morgen varies greatly; if sown for growing hay the drills should be four inches apart and with a drill would take about 25 lbs. of seed to the morgen, if sown broadcast it would take about 35lbs. If sown for growing seed the drills should be about eight inches apart and would take about 15 and 25 lbs. respectively per morgen. If sown by a farmer with plenty of land and very little water, the best results will be got by sowing 12 inches apart in the rows and running the water in small sluits between the rows.

The best time for planting lucerne in the Eastern Province is from the end of January to the end of May. I have seen it doing well sown at other times, but as a rule it fails from scorching or is eaten by caterpillars.

No stock should be grazed on lucerne for at least six months after sowing; if grazed earlier the probability is that the plant will be set back for a year or more.

IRRIGATING LUCERNE.

The critical time with lucerne is the first six weeks of its growth. Watering during this period puts the plant back, covering the young plant with soil and stopping up the pores of the leaves. As soon as the weeds begin to trouble the young plant by smothering, the piece should be run over with the mower, which checks the weeds and at the same time improves the lucerne by making it more stocky and it stools out better. Where the ground is full of weed seeds, it will perhaps be necessary to cut it two or three times for the purpose of entirely destroying the weeds.

After the lucerne is well established, a single irrigation will be generally found sufficient for each cutting; more water is found to make the stalks too sappy and therefore difficult to cure.

Four to five cuts can be obtained in the summer and one to two in the winter. The lucerne should not be watered during the winter months, as this tends to keep the roots near the surface, to rot the crown, and destroy its natural rest.

Plenty of water during the summer months will be found preferable to watering in the summer and winter too, as if watered in winter and after watering a frost comes the plant will be set back.

The water should be stopped and put into the next bed, before reaching the end of the bed (this point will be ascertained by observation), otherwise there will be standing water at the end of the bed, or water will run to waste.

Ordinary brack water does not harm lucerne, but it grows better with fresh water.

Water carrying a large amount of silt is not a good thing, except before deep cultivation, as it is inclined to choke it, and if a thick layer of silt is put on it will kill it by suffocating it.

Both for allowing water to get well into the ground and for aërating the ground every piece of lucerne should be deeply cultivated once a year with a cultivator having wedge-shaped tynes as perpendicular as possible, not more than two inches broad in the broadest part, otherwise a large number of plants are cut out. Lucerne should also be harrowed after every water leading and if possible after every decent rain, if not too high. This will be found to pay; the crop growing quicker and the base is kept clean, so that when raking, the hay has not a lot of decayed rubbish in it.

HARVESTING LUCERNE.

Lucerne intended for hay should be sown thick, as then the stalks do not grow so thick and the hay is better, and more easily cured. It should be cut when just coming into flower; let it lie until wilted, then rake into wind-rows, and if hot, dry weather it will be ready to be put in small heaps in 24 hours. It should not be touched, if possible, except in the early morning or in the evening, otherwise many of the leaves will be lost. The small heaps should be gradually collected into large ones, which should be turned completely upside down every day; after the big heaps have stood three or four days, they will be ready to be stacked; ride on to the stack early and late, so as not to be moving the hay in the hottest part of the day.

When stacking, some sort of ventilator should be put in. A good plan is to put a large basket in the centre and lift it as the stack rises, which leaves a vent hole right up the middle and minimises the risk of over-heating. In America wooden ventilators are used, running diagonally through the stack.

Salt sprinkled over each layer of hay as stacked helps greatly to preserve it and makes it more palatable and more wholesome for stock.

If the grower's intention is to press the hay on the land, the large heaps must be left for seven or eight days. In the writer's opinion this is by far the best and the best paying way of treating and selling lucerne hay. The risk of fire and loss of weight in stacking counteracts the extra price obtained for old hay, and it is doubtful in this country (at present) whether more would be got for old hay than for new.

GROWING FOR SEED.

In growing for seed, lucerne should be planted further apart in the rows and thinner, so as to give each head room to reach its full growth. The first crop of the season is generally the best and gives the best results. Cut the crop a little before it is dead ripe with the mower (without reaper attachment) and set the cutting bar high, otherwise while cutting and curing a large quantity of seed falls out. A seed crop should not be raked but collected by hand. When sufficiently cured ride and stack until thrashing. A sail spread on the floor of the wagon when riding to stack will save a lot of seed.

THE GREATEST FORAGE PLANT IN THE WORLD.

A morgen should yield somewhere between 800 and 12,000 lbs. The chaff will be readily eaten by stock. Lucerne grown for seed requires about half as much water as when grown for other purposes.

THE ENEMIES OF LUCERNE.

The greatest and almost only enemy of lucerne in this country is dodder, which lives on the lucerne, and if not checked will eventually kill it. Dodder is a plant living on a host, an annual with slightly purplish flowers, each flower containing four seeds, which when ripe fall to the ground and start growing.

The best way to get rid of this plant is to cut the lucerne and prevent the dodder flowering; another plan is burning it.

If seed is procured from well known reliable seedsmen, it will be free from dodder, and the farmer will keep free if his neighbours don't interfere.

Locusts trouble lucerne very little; the brown ones eat a little if they sleep on it, and the red-winged ones eat rather more; but it seems to disagree with them, much in the same way as it does with cattle (new to it), viz., by blowing them up.

Caterpillars and beetles tackle it a little, eating mostly in patches and sometimes eating all the leaves; they often destroy very young lucerne put in in October, November and December and the early part of January. The best thing for them and you is to roll them with a heavy roller.

In humid climates lucerne suffers from root rot; this does not seem likely to trouble us.

FEEDING STOCK ON LUCERNE.

The great advantage of stock farming on lucerne is, that the whole of the stock are seen every day, the area being so small as compared with ordinary grazing farms; the farmer, so to say, has all his stock always under his eye.

OSTRICHES.

Plucking Birds.—Ostriches thrive well on lucerne, growing heavier feathers, feathers with more gloss, and the quills can be pulled two months after cutting the feathers.

To make a farm suitable for carrying a large number of birds, it is necessary to divide it by natural or wire fences into camps of about five morgen each, grazing the camps as nearly as possible in rotation. They should never be put into a camp before the lucerne is at least nine inches high; as, if put in when shorter, they eat the crown and seriously check the growth of the plant.

A morgen of lucerne will carry six birds on a farm having not less than fifty morgen. A hundred morgen farm or more will carry eight to the morgen, for the reason that each camp has a longer rest. A rest should be given in the winter months by putting the birds in a dry camp and feeding with cut up lucerne hay, mixed twelve hours before feeding with a part of green food, also cut up. Birds are not particularly fond of chaffed dry lucerne hay; if no green food is procurable, wet the chaffed hay over night.

Birds suffer little from disease when fed on lucerne. All watercourses should be fenced on both sides, otherwise it is impossible to keep the birds from rolling in the furrows, and so ruining their feathers.

The best and most economical method of farming birds with lucerne is never to allow the birds on the land, but to keep them in large veld camps and feed them with cut up lucerne. This is very little trouble and not expensive in working. The lucerne is cut with the mower, chaffed with horse gear and large chaff cutter, and the cut up food ridden in a cart to the birds. The cart should be driven well out into the camp, and a boy sitting in the back shovels the chaff out behind as the cart goes along.

Two mules can do all this work, and by this method 500 birds can be fed a day. Care should be taken not to start feeding near the fence or gate, as birds will in that case often stand waiting all day. The route through the camp should be often changed where practicable. By this method three times the number of birds can be kept off the same piece of lucerne.

The greatest enemy to birds in lucerne is the Kaffr dog. These must be kept down; one dog will do a tremendous lot of damage, where there are so many fences and no bush or cover.

The great drawback to keeping birds always on lucerne, is, that it will in all probability in time lead to disease, and if to a virulent disease, the farmer would probably lose all his birds, they being in such a confined space.

Breeding Birds and Chicks.—These, I believe, with selling hay, pay the lucerne farmer best at the present time.

The breeding birds should be kept in veld camps, surrounding the lucerne land, as near as possible; camps of 2½ morgen are quite sufficient. This plan is much better than keeping them in lucerne camps, giving more shelter and keeping them quieter. They should be fed with chaffed lucerne every day at the rate of one bag to five pairs, also with about two lbs. of mealies per pair a day in the season when not sitting. When sitting the mealies should be stopped, as they are inclined to heat the blood and make them restless.

The percentage of fertile eggs is higher when fed on green lucerne than when fed on any other food, or than when running on the best of veld.

A pair of breeding birds fed well will have two to four nests in the season, bringing out an average of ten chicks per nest.

The chicks should be taken away when two days old and put on short lucerne, as soon as the dew is off. I have found it best to have a small boy with them until they get used to the wire netting, otherwise they get their heads and legs fast. They will begin to peck the lucerne the third or fourth day after hatching.

Great care must be taken in keeping the sleeping place perfectly clean, otherwise disease is certain to appear, and on farms of this small area, with a large number of chicks, it is a very serious matter to get any disease, such as yellow liver for instance.

Not more than 50 chicks should be kept together up to three months old, partly to guard against disease carrying off the whole of them and partly to prevent overcrowding, which they are very apt to do for warmth, the weaker then suffering and are sometimes suffocated.

Houses built for chicks should be round, so as to prevent crowding into the corners.

If care is taken and cleanliness adhered to, very few chicks will be lost (a loss of 5 per cent. is high when brought up on lucerne), and if sold with feathers in five or six months, this plan of farming lucerne will be found to pay as well as any.

The chick feathers grown on lucerne are first class, if the birds are kept from rolling in the furrows.

CATTLE.

Oxen will fatten in from 13 to 16 weeks if grazed on lucerne, and in a much shorter time if fed on lucerne in stalls, this of course is owing to their taking less exercise; but there are many drawbacks to feeding in stalls. First, the expense of erecting them; another is the worrying of flies, and another the expense of the attendant, as they take a great deal of attention.

The best way of fattening oxen is in connection with other stock, such as birds. The oxen are put on after the birds, so it depends upon what the birds are allowed to leave, how many oxen can be fattened on the morgen.

Great care must be taken when putting oxen or cows on lucerne (or on a fresh piece) for the first time. They should not be allowed to stay for more than 20 minutes at a time, and if they have never been on lucerne before they should not be put in hungry. As a rule, if they have never seen it before they will not eat large quantities the first time. In all cases they want careful watching, and the trocar always handy.

To show how much risk there is, Mr. Probart, of Graaff-Reinet, told me that some of his milch cows had as many as three holes in them, and hardly a single one's skin was whole or without a hole.

Dairy farming pays well on lucerne; the milk is perhaps lower in quantity than when fed on meadow grass or barley (green), but the quality is superior. The above remarks as to stall feeding and loose apply equally here.

100 morgen of lucerne should keep 100 cows with the other stock. I shall refer to this later.

It is much more economical to keep the cows out of the lucerne and feed them in the kraal in mangers; the lucerne has only to be mowed and ridden on, it should not be chaffed, as they will then eat too quickly. When starting, give mostly lucerne hay and very little green lucerne; when they are quite accustomed to the green lucerne, a good ration for milk is three parts green and one part hay; when dry reverse this. Large calves should have half and half.

HORSES AND MULES.

If not wanted for fast work lucerne hay is a splendid feed alone, but if they do fast work a little grain should also be given. Yearlings and two-year-olds thrive better on lucerne fields with at night and morning a little hay, than on anything else; of course the latter when not in work.

It is the cheapest food that can be bought (grown in this country), as none of it is wasted like forage, half of which is generally under the manger.

SHEEP.

30 miles from the coast sheep fatten and do well on lucerne, but nearer than this lucerne farmers are bothered with gall sickness, which when the sheep are feeding on lucerne is very virulent.

They fatten in from six weeks to two months, and scale up to 75 lbs. The same care must be taken with them as with cattle as they are very prone to hoove, and in their case the use of the trocar is very dangerous.

Sheep are fattened in connection with birds and cattle, and we often put on after harvesting and before watering.

Breeding pedigree sheep would, I should think, pay well on lucerne, as they would grow to perfection; this I think has not been tried.

PIGS.

I have fed pigs in a stye on lucerne alone, and I can't say they do well.

In America they go in for fattening pigs, running on the lucerne. They put from 10 to 15 pigs on an acre for six months, in which time (weighing 400 pounds), when put on, they gain another 100 each. pounds of pork are worth there 50 dollars or £10 8s. 4d.

POULTRY.

Fowls and turkeys on a fairly large scale fattened on lucerne will be found to pay and do handsomely, fattening very quickly, and a large number can be fattened on a comparatively small piece.

At night they roost in a galvanized iron house on wheels with broad tires, and a pair of shafts or a pole for the horse or two mules to move house and poultry to pastures new. The house should be moved when the poultry have retired for the night and before they settle on the perches.

The house must be kept perfectly clean to guard against disease. The best way to do this is to thoroughly clean it every morning, and to syringe the inside with strong dip and water.

The poultry should be moved at least once a week. A little trouble will be experienced at first in getting the birds into the house, but when once taught no trouble will be followed by the new arrivals.

Ducks and geese eat more than they are worth.

Breeding thoroughbred fowls on lucerne is expensive. For this it would be necessary to keep a piece of lucerne (say ten morgen) for this purpose alone.

This would have to be divided into wire-netting camps for the separate lots and breeds, and in some cases netted overhead, each camp to be not less than a quarter of an acre, or 30 yards by 40 yards.

Light moveable houses should be made and only half the camps used at one time. The land should be laid out and used in such a way that camps not in use can be watered in one piece, so as not to risk flooding camps in use.

HOW TO MANAGE AND WHAT STOCK TO PUT ON (FOR INSTANCE) 100 MORGEN WITH OUTSIDE VELD,

OUTSIDE VELD ONLY RECKONED AS AN EXERCISING GROUND.

It must not be taken for granted that because 100 morgen feed a certain number of stock 50 morgen will feed half that number; 50 will feed rather less, for the reason that there are not so many camps and the turns come round quicker. Likewise a larger farm than 100 morgen will feed more stock per morgen.

100 morgen of lucerne will feed 400 plucking birds, 80 to 100 cows, 400 chicks (ostrich), the latter as they come on, from birth to 5½ months old, 20 pairs of breeding birds, if kept in outside camps and fed from the land, all necessary working animals, and will fatten 30 oxen and from 200 to 300 sheep in the year.

If none but small stock are allowed to run in the land 1,000 plucking birds and 150 cows could be kept.

100 MORGEN LUCERNE WITHOUT OUTSIDE VELD.

With these conditions I should leave full-grown birds alone, as I am convinced that farming birds in large numbers on such small areas will sooner or later lead to disease.

Dairy farming, fattening oxen and sheep, rearing chicks bought out of the nest or in a month to two months old, and selling at 5½ months, should be the farmer's business, and last, but by no means least, selling lucerne hay.

PROFITS OF GROWING LUCERNE HAY FOR MARKET.

Lucerne can be cut from four to six times in the Summer, and from once to twice in the Winter.

Taking five cuts a year, and giving at the lowest estimate one ton per morgen, per cut of hay, we then from 100 morgen get 500 tons of hay per annum.

The present price of lucerne hay is from £5 per ton upwards delivered by rail within 50 miles of the principal market towns; the cost of riding to the Station would be covered by 10s. a ton, if not more than 10 miles. This gives £4 10s. per ton on the farm, or a gross return of £2,250 per annum.

Growing lucerne for hay alone is by far the least expensive method of farming it. A nett income of £1,500 can fairly be expected from the above. Even supposing the price dropped to £3 10s., it gives an excellent return.

This year lucerne hay went as high as £7 17s. 6d. per ton on the Port Elizabeth morning market.

STARTING A LUCERNE LAND.

In starting a lucerne land on bush land, the whole of the place to be planted should be cleared first, otherwise the easiest plan of levelling it cannot be ascertained. Money spent levelling is often wasted by levelling as you clear doing a small patch at a time, and when the whole is finished the owner feels inclined to kick himself for being in such a hurry.

No division fences should be erected before the whole is planted, as they are always in the way when turning at the ends, and a lot of expensive land finishing has to be done.

Always if possible put lucerne in on new ground, with rain, not irrigation water (this applies to irrigation from rivers, not underground water); this, in this country, is seldom possible; but when it is, it will be found of great advantage, as your lucerne will require no weeding, and by the time the irrigation water is applied the lucerne will have got a good start, and the weed seeds brought in the water will stand no chance.

For the first two years very little, if any, return can be expected. Keep a good-sized piece for barley and mealies, the barley for green stuff in the winter, and the mealies for breeding birds.

LUCERNE WITHOUT IRRIGATION.

Unless water is within 10 to 20 feet of the surface, and the soil above water is of a porous nature, lucerne is not worth planting in the Eastern Province, the rainfall being so small.

NOTE.

The foregoing essay having been written over a year ago, but owing to the war not published until now; there has in the meantime, naturally, been some progress made, viz :—

AS TO THE STACKING.

It is now found to be quite a mistake to stack lucerne hay, as it makes the hay so harsh. The best way, as far as present experience goes, is either to press on the land, or better still, to ride when in small cocks to the press, and allow to remain for about seven days in a heap by the press before pressing. The latter because it is often necessary to get the land clear for watering. By treating lucerne hay in this way, more weight is obtained, the bales look very much better, all kinds of stock eat it more readily, and waste less. The expense of stacking and risk of fire is also saved. That which the farmer keeps against a dry day, will if pressed take less room than if stacked; of course, it would have to be put under cover, but as most farmers have sufficient buildings for their own necessary stock of forage this would not be an extra expense. The surplus is sold as soon as baled, unless the farmer is also a speculator.

LAYING OUT LUCERNE BEDS.

Where the ground is not in slopes, when it would be too expensive, the best way to lay out ground for lucerne is, in level squares about 70 yards by 70 yards, with no fall in any direction; these squares being more easy to cut and save expense in making banks, furrows, and labour in irrigating. Four of these squares would cover about a square of two morgen, and to water the whole only 70 yds. of furrow would be necessary; all watering from the centre of the two morgen square.

PRIZE ESSAY, BY MR. F. FRANKS.
Published in the *Midland News*.

Beet Sugar and Cane Sugar.

The views of Dr. R. C. Kedzie, agricultural chemist at the Michigan Agricultural College, upon the relative value of cane and beet sugar are expressed as follows in the *Louisiana Planter* upon the points whether beet sugar can be used for the same purposes as cane sugar; its fruit preserving qualities. The subject has of course been discussed in the *Journal* some time ago, but it is interesting at this date to have the opinions of the successful promoters of the industry elsewhere.

BEET AND CANE SUGAR ARE THE SAME.

Dr. Kedzie says:—"There is only one answer to these questions. Cane sugar and beet sugar are the same. It is not a question of similarity, but of identity. Chemists, the world over, are agreed as to the identity of cane and beet sugar, and all statements of differences in properties—of inferiority or superiority in these sugars —are made either in ignorance or for deception. We sometimes say "as like as two peas"; but no two peas are exactly alike. Such comparison does not hold on this subject, for it is no question of likeness but of identity.

WE USE BEET SUGAR.

The suspicion was aroused by the sugar trust that beet sugar was inferior to cane sugar, and this suspicion has been carefully nourished by the sugar trust, and the statement has been so often repeated that many folks have believed it. What are the facts? For the last three years the people of the Northern States have used beet sugar almost exclusively.

If it had not been for the beet sugar of Europe the world would have gone hungry. Beet sugar at this time furnishes two-thirds of the world's supply. The supply of refined sugar for our own use for three years past has consisted very largely of beet sugar from Germany and France.

TRUST SELLS BEET SUGAR.

When Prof. F. S. Kedzie returned from Germany in December, 1898, he took passage at Hamburg on the large freight steamer *Pennsylvania*, and her entire cargo (19,000 tons) consisted of raw beet sugar from Germany for the sugar refineries in New York. This was only one shipload of raw sugar, and cargo after cargo was brought from the same source and for like purposes, viz., to be refined by the sugar trust and then sold for "pure cane sugar." Did the sugar trust ever inform us that they were selling beet sugar, and that their vaunted cane sugar was in large part only refined beet sugar? I trow not. And these are the parties who are warning us about the inferior qualities of beet sugar and the superiority of cane sugar."

WHY THE DECEPTION?

Why such deception? Because the American manufacturers have brought the process to such perfection that they turn out from their factories refined sugar, and nothing but refined sugar, requiring no aid from the sugar refineries of New York. If this superior process comes into general use "Othello's occupation is gone," our own factories will furnish our people with pure sugar, and the sugar trust with its peculiar methods may retire from the scene.

Beet Sugar.

Is Cane or Beet Sugar the Sweeter?

Several years since, says the *Utah News*, we entered into a long discussion relating to the comparative value of cane and beet sugar. We then pointed out that the two sugars were identical from both a chemical and physical standpoint. We stated also that upon general principles it might be admitted that if there was a difference it was due mainly to the fact that one of these sugars was generally alkaline, and the other acid, which might form a preliminary method of distinguishing between the two. We suggested that a series of experiments be made with lemon juice and water, and that a certain number of persons were to taste lemonades sweetened with a given amount of both sugars. We have since then made the experiments, and are more than ever convinced that the two sugars, from a sweetening point of view, are identical. The reason that raw cane sugar is sweeter than raw beet sugar is that the former contains a smaller percentage of salts than the latter, these salts, however, conveying, in the case of cane molasses, a sensation of sweetness that even white sugar does not possess. The reason is explained by the stimulation caused by the salts upon the organ of taste, the transmission to the brain then being more rapid than it is in the case of refined white sugar that must first melt in the mouth before we realize that it is sweet. The *Louisiana Planter* has been discussing the question of cane and beet sugar, and says that a well known professor declares himself in favour of the blindfolding method with various sugar solutions, and taking an average of the judgment as to any apparent sweetness. We beg to state in this writing, as we have previously done, that such tests should be made side by side, not only with two sugars of the same polarization, but having been refined by identical modes. If this factor is not taken into consideration the results obtained would be very misleading. There remains a whole field open for a series of investigations to show just within what limits refining processes of various countries influence the sweetening power of a given weight of sugar. The question, to our knowledge, has never been discussed in the leading textbooks.

Will America Grow its Own Sugar?

The *Farm and Fireside*, an American agricultural journal, publishes what purports to be a statement by the Secretary for Agriculture at Washington made in the course of an interview. It is interesting in view of the attention that is being bestowed just now upon the beet sugar industry. Mr. Wilson is thus reported to have said that one of the principal objects which the United States

Department has in view is to enable the people of the United States to produce the agricultural products they are now purchasing from foreign countries. During the year 1900, for instance, they bought half as much agricultural goods as they sold; that is to say, they sold about £168,800,000 worth and bought about £84,000,000 worth. The principal product they purchased from other nations was sugar. That commodity comprised nearly one-fourth of the total of products imported. The Department had been making experiments to ascertain in just what sections of the country sugar could be grown to such advantage as to obviate the necessity of going to foreign markets to complete their supply. They want to grow beets, as therein lies the principal source of the sugar product. Within the United States there will be over 40 beet-sugar factories in operation by next autumn. They will be situated in almost every State along the northern border, from New York to California. Mr. Wilson believed that within a few years they would produce all the sugar they required, and they would then be in a position to ignore the foreign product. Their experiments had shown that the sugar produced from their quality of beet is much richer than that manufactured in foreign countries. Their product, therefore, will be much more desirable.

When this result should be attained the sugar trust would, in Mr. Wilson's opinion, vanish, for the reason that the trust refineries imported brown sugar, while all the American factories would finish the product and place it in entire readiness for sale on the market.

Artificial Manures.

The annexed list showing the agents from whom the various artificial manures may be obtained, and the current prices, is published for the information and guidance of agriculturists.

Full particulars as to the composition of the respective fertilizers can be obtained on application to the agents; and attention is also invited to the analyses published in the *Agricultural Journal* of 9th January, 2nd April and 11th June, 1896; 30th Sept., 1897; 27th Oct., 1898; 13th April, 6th July, 1899 and 18th July, 1901.

LIST OF FERTILIZERS.

Attwell & Co., Cape Town. (Agents for Alex. Cross & Sons, Ltd., Glasgow.)	Special Root Guano ..	£6	10	0	per ton of 2,000 lb,
	Potato and Grain Guano ..	8	5	0	,, ,,
	Nitrate of Soda	12	0	0	,, ,,
	Superphosphates 39/40 per cent ..	6	0	0	,, ,,
	Scotia Basic Slag (cont. 30 per cent. Tribasic Phosphate of Lime)	4	15	0	,, ,,
	Sulphate of Ammonia ..	0	19	6	per 100 lb.
	(Prices free on trucks, Cape Town)				

Jas. Searight & Co., Cape Town.	No. 1 Superphosphates (containing 12·14 per cent. Phosphoric Acid soluble in water, being equal to 26·30 per cent. Tribasic Phosphate of Lime).	£5 0 0 per ton of 2,000 lb.
	No. 2 Superphosphates (containing 14·16 per cent. Phosphoric Acid soluble in water, being equal to 30·35 per cent. Tribasic Phosphate of Lime).	5 10 0 ,, ,,
	No. 3 Superphosphates (containing 17·18 per cent. Phosphoric Acid soluble in water, being equal to 37·39 per cent. Tribasic Phosphate of Lime).	6 0 0 ,, ,,
	Vine Fertilizers	9 0 0 ,, ,,

A reduction of 5s. per 2,000 lbs. is allowed on orders of 100 bags or more. Special rates can be arranged if delivery is taken ex importing steamer, the goods being trucked at Docks.

Woodhead, Plant & Co. Cape Town.	Thomas' Phosphate Powder	£4 15 0 per ton of 2,000 lb.
	Superphosphates	5 15 0 ,, ,,
	Nitrate of Soda	14 0 0
	Muriate of Potash	16 0 0
	Sulphate of Potash	16 0 0
	Wheat Fertilizer	8 10 0
	Kainit	4 15 0
	Potato	1 15 0 per 200 lb.
	Vineyard Manure	1 15 0 ,,
	Tobacco Manure	1 15 0 ,,
	Sulphate of Ammonia	1 2 6 per 100 lb.
	Subject to a discount for cash.	
De Waal & Co., Cape Town.	Jadoo Fibre	10s. 6d. per bale of 100 lb.
White, Ryan & Co., Cape Town.	Potato, Vegetable and General garden	£8 10s. per ton of 2,000 lb. If less than ½ ton 18s 6d. per bag of 200 lb.
	Pure Ground Bone	£6 10s. per ton of 2,000 lb. If less than ½ ton 13s. 6d. per bag of 200 lb.
	Quick-acting Bone and Potash Mixture	£7 per ton of 2,000 lb. If less than ½ ton 16s. per bag of 200 lb.
	Selected Bone Meal for Cattle, Horses, Pigs and Poultry	15s. 6d. per 100 lb.; special price per ton.
	Bone Grit for Fowls	12s. 6d. per 100 lb.
	Superphosphates	Wholesale only.
Malcomess & Co., E. London.	"Malcomess" A. Fertilizer, for Potatoes, Mealies, Vegetables, Orange and other trees	£9 per ton of 2,000 lb.
	"Malcomess" B. Fertilizer, for cereals, especially wheat	£9 per ton of 2,000 lb.
	Accompanied by guaranteed analysis by Prof. Hahn	(less 5 per cent for cash).
James Flower & Sons, Cape Town.	"H.B.T." Gypsum	£3 10s. per ton of 2,000 lb.
	Pure Ground Bone Meal	£8 10s. ,, ,, (in bags f.o. trucks—Cape Town).
Government Guano :—	Ordinary Guano	£6 10s. per ton of 2,000 lb. or 13s. per bag of 200 lb.
	Rock Guano	£6 17s. per ton of 2,000 lb. or 13s. 9d. per bag of 200 lb.

For use within limits of Colony.
Price includes delivery at Cape Town Railway Station.

HORTICULTURE.

Morocco Dates.

With the exception of the three chief cities, Fez, Mekinez and Marakesh, the interior of Morocco is but little known to Europeans. The trans-Atlas regions are quite untravelled, though in the Igli and Tuat districts in the shadowy-bounded hinterland of Algeria the French are now firmly established. Few white men have reached Tafilet, however, and in spite of the fact that there is no reader of these lines who has not consumed its chief product, dates, remarkably little seems to be known about their cultivation. Mr. MacLeod, our first consul established at Fez, furnishes some details in his report, from which it appears that an enormous number of varieties are grown, that dates, in short, are much like our apples and pears in this respect, for there are said to be as many as 200 different sorts. That date-stones will germinate freely in our greenhouses is a matter of common knowledge, and it might be imagined that, as in the case of almost every other palm, cultivation by seed would be the method adopted. This, however, is not so. It is found that when raised from seed more male than female trees are produced. Accordingly suckers are used instead, old female trees bearing these in numbers, and the young plants thus obtained are planted about 12ft. apart in good open soil. They are irrigated lavishly four or five times a year, and are hand-watered constantly, and although the tree is one that stands drought well, the more frequent the watering is at this period the better. When established, the plantation is thinned out, the plants being kept at least 30ft. apart. After the first year they are regularly and plentifully manured, and with good treatment they will have attained the height of 6ft. in ten years. They are said to live for several hundreds of years.

The date begins to fruit about the fourth year, and the crop increases yearly until a maximum of about four to five cwts. per tree is attained, but this will not be before the twentieth year. The fruit is gathered just before it is ripe, and it is then spread out in the sun and turned continually, the women taking charge of the drying process. Rain falling on the crop, whether just before gathering or afterwards, completely ruins it.

The date which reaches the London market is the sort known as "majhol," a large luscious fruit of a greenish brown colour when fully ripe, and with a large stone. It is not much esteemed by the Moor, who, regarding the fruit as a dinner rather than as a dessert, prefers something less sweet and cloying. A small, dry kind pressed into solid, hard masses of a yellowish colour, forms the usual preparation affected by the traveller, and its nourishing and sustaining power as a food is said to be very high. The smallest kinds of all are very cheap, and are used chiefly as food for horses and cattle.

The earliest caravans of the season leave Tafilet about the first week in October for Fez, a long ten days' journey. They continue arriving nearly to the end of the year. At Fez they are sold by public auction, and while the ripest and smallest are used for local consumption, the "majhols" are loosely packed in paper-lined wooden boxes containing from 45lb. to 50lb., and forwarded to London, where in a good market they may fetch as much as 110s. per cwt. Later in the season they are cheaper, and are sometimes sold for as little as 30s. The initial cost at Tafilet averages about 5s. 6d., but so high are the taxes and "satat"—a sort of tribal blackmail—that they do not reach London under 30s. In this connection Mr. MacLeod strikes an ominous note of warning. The French are now at Igli, and expect to have extended the Algerian-Sahara railway to that point in the course of a year or thereabouts. Igli is only an easy four days' caravan journey from Tafilet, and by sending the dates by this route, and exporting from Oran, the charges will be immensely reduced. This tapping of the trade is practically a foregone conclusion, and probably ere a few years have passed Paris will have become the date market of the world, *vice* London resigned.—*Field.*

The Christophine or Chayote.*

A New Vegetable for the Cape Market.

Sechium edule Swz.

In 1895, M. Paillieux, a distinguished member of the French Société d'Acclimatation, whose speciality was the introduction of new hardy esculent vegetables to Continental gardens, sent to me a dozen fruits of the plant whose name heads this article, hoping that its culture might be taken up at the Cape. They were distributed to several gardens here, with a brief note as to the very simple culture required. But if you want to have anything done which is contrary to established custom and routine, you have to do it yourself mostly. In only one instance was the distribution followed by success. Mr. Eustace Pillans raised the plant, and in its second season had it climbing in profusion over a large trellis and showing a crop of ninety fruits. From this beginning a basketful was sent to

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* See Bulletin No. 28, U.S. Department of Agriculture; Division of Botany: The Chayote, a Tropical Vegetable, by O. F. Cook. Washington, 1901. It may be as well to add that the Mexican name is pronounced *Chi-ó-tay.*

the cuisine of the Civil Service Club, and another lot was exhibited in the window of a leading fruit-dealer with an explanatory label. Certainly, a message of thanks and approval came from the Club, but there the matter ended. Two or three other amateur gardeners now have the plant, but it is disappointing to find that it has not been taken up by the purveyors for our vegetable market, and is only known to a few people as a curiosity. I dare say, if we had on record the primæval history of the cabbage or of the turnip, we should find that the man who first grew and ate these esculent novelties was similarly disappointed when he pressed them upon the attention of his prehistoric neighbours. They no doubt asked why they should venture to eat such new-fangled stuff when there was such an abundance of acorns to be had—a food which had stood the test of centuries and had been eaten by their forefathers from time immemorial.

But if we of the Cape have not as yet recognized the value of this succulent dainty—a sort of squash that is not exactly a squash but something far better, and which comes in season when the ordinary squash has not begun to show a leaf above ground—other countries and colonies which have a climate somewhat similar to ours have done justice to it. With them the chayote has come to stay and puts in an appearance regularly upon the market. The U.S Department of Agriculture has just issued a very complete monograph of all that has to be said about this valuable addition to the resources of our table, and there can be no doubt that the Gulf States and California will very shortly send it up to the Eastern centres of population in large quantities. Algeria already forwards hundreds of tons of the fruits to Paris and London as a special winter vegetable, and it has begun to gain popularity in Queensland.

An account of the "Christophine" was given in this journal* just about the time of its successful introduction here. But seeing that reiteration is accepted as a sort of argument, and that if you mean to push your produce you must keep on bawling out its virtues till the public catches on and listens, a resumé of the excellent American memoir is here presented to the readers of the *Journal* with a characteristic figure. In the short article cited below the fruit was spoken of as the "Christophine," that is, using the name by which it is known in the Mauritius, under the impression that this word would acclimatize itself among us more readily than the Mexican synonym "chayote." But seeing that the American official bulletin here summarized keeps throughout to the latter designation it has been retained in the following pages taken therefrom.

DESCRIPTION.

The Christophine or Chayote is a climbing plant belonging to the same family as the pumpkin, melon, cucumber and squash. It does not, like so many others, lie prostrate on the ground, but trails extensively over hedges or trellis-work; a single plant often making fruit-bearing branches extending forty feet in length. It forms after the first season's growth a huge underground tuber, as large as a man's head, and from this new shoots arise when the seasonal growth commences, The tuber is eatable and somewhat resembles a yam in character, twenty per cent. of its bulk consisting of a small-grained starch, very like that of wheat. The flowers are not at first sight very suggestive of those of the related species, being only about ¾ of an inch across, and are borne along the axils of special branches which thus have the appearance of long-stalked racemes. They are of two kinds, as is commonly the case in the cucumber tribe, males or staminate flowers, and female, pistillate, and consequently fruit-bearing flowers. The fruit is peculiar, and in no way recalls to the observer that of the cucumber or squash. It has rather the aspect of a coarse rough-coated pear, with a green skin from which project more or less numerous hard points. Since the plant has been in culture for centuries and was known and valued in its native country of Mexico long before the Spanish conquest, it is not surprising to find that it has deviated into numerous varieties. In some of these the ob-conic pear shape is reversed and the fruit becomes irregularly ovoid and pointed at the apex. In others it is almost globular in general outline, but nevertheless furrowed and lumpy. According to the variety, the fruit may weigh from 4 oz. to about 10 or 12 oz. This may seem a poor record for an esculent market vegetable, but the enormous number of the fruits on each fully developed plant fetches up the total quantity by weight to an excellent figure. From a New South Wales record it appears that a plant, started in February, flowered in May, but was cut down by frost and did not resume growth till August, when it sprouted again from the root and by January had covered fifty feet of a fence six feet high.

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* Vide *Agricultural Journal*, vol. vii. p. 614.

PROBABLE PRODUCE.

From the end of February to June, three to four dozen fruits were taken off every week, say 500 fruits for the season of three months; and this in the first year of bearing. As the perennial root continues to increase in size, such a plant may well have been larger in subsequent seasons. One observer reports having counted 300 fruits upon a single plant. Taking as a low average 8 ounces for the weight of these fruits, they would have given a total of 150 lbs. Hence it will be clear that the chayote is one of the most prolific of herbaceous esculents, making up in numbers what its fruits lack in size in comparison with the larger Cucurbitaceæ. In Algeria, Dr. Trabut states the yield to be from 25 to 100 fruits per plant. Naudin, the veteran horticulturist, estimates that one hectare of land (2½ acres, nearly) should, under good cultivation, produce 120,000 fruits. The former authority reckons that in the extensive market gardens of Algeria, chayotes can be profitably produced at 15 francs the hundred kilos (say, 5s. 1d. per 100 lbs.). Packed, shipped and delivered in the markets of Paris, Algerian chayotes can be furnished all winter at from 30 to 50 francs per hundred kilos (about 10s. to 17s. per 100 lbs.), the shipping expenses being very frequently more than the original value of the fruit.

QUALITY, VALUE AND VARIETY.

According to Dr. Edward Palmer, the chayote is considered a delicacy at Saltillo in Mexico, where on account of frosts it is necessary to protect the roots in winter by an extra covering or mulch of straw. The market price there, 5 cents, is accordingly much higher than in the city of Mexico, where the roots as well as the fruits are commonly on sale, resembling those of the yam and the larger sorts of cassava. In Louisiana, the chayote, there called the *mirliton*, has been grown for many years, although its cultivation and use are limited almost entirely to the creole population of the vicinity of New Orleans, and to occasional neighbours who have chanced to become acquainted with it. Fairchild, who made enquiries on the subject in December, 1898, found that mirlitons were selling in the French market of New Orleans at 15 cents apiece, a price which certainly would not be paid were not the chayote considered to be a table delicacy superior to the vegetable marrow. At such a price the culture of the chayote would be most profitable, even in Louisiana, where an average of only 30 to 35 fruits is expected from each plant.

At the time of the author's visit to Porto Rico in the latter part of 1899, the chayote was one of the more important vegetables in the markets. That it is a staple article of culture which can be produced readily and in any required quantity was apparent from the fact that while nearly all other kinds of farm produce were bringing high prices according to United States standards, three chayote fruits were being sold for 5 centavos, that is, for one cent a piece in American money. If, then, the New Orleans demand were sufficiently extensive, importing chayotes from Porto Rico would be profitable.

PECULIARITIES OF EARLY GROWTH AND ADAPTATION.

The chayote differs singularly from the usual type of the Cucurbitaceæ in being one-seeded. We are familiar with the handfuls of seeds which ripen in a pumpkin, a melon, or a large vegetable marrow, but here we have a relative of these well-known plants which has but one ovule in each fruit, and the seed-coats are very imperfectly separated from the fleshy mass in which it lies. At maturity the embryo is shut up in the fruit, but before the ordinary germination begins, it has grown considerably at either end, so that the future apex of the plantlet has pushed itself further towards the base of the fruit and the part which is to form the root has emerged from the blunt tip. In cultivating the chayote, therefore, no attempt is made to separate the already germinating plantlet from its fleshy and nutrient seed-coats, but *the entire fruit is placed in the soil*, and the very rapid starting of the embryo into growth is due to the large quantity of nutriment which it thus has at command in the mass of tissues with which it is surrounded. In general, the food-material required for the first vegetative life of the plantlet is stored away in the thick fleshy cotyledons or seed-leaves. One sees them standing conspicuously fronting each other when a bean, a lupine or a pumpkin seed begins to peep above the soil. The shoot arises between them and the root is descending from the hypocotyl or first joint below them. At first the rootlets are few and short and are not capable of getting from the soil all the material needed for the plantlet's growth. The nutriment required is therefore supplied by the contents of the cotyledons, and these become wrinkled and shrivelled up through the loss of the material taken from them By the time they are emptied and are ready to fall off as no longer useful, the root system has become vigorous and equal to any demands made upon it. In many other plants this same food-material is not gathered into the cotyledons or seed-leaves, but instead of being *in* the plantlet it is packed *round* it. But none the less is it available as a source of supply. The little plant rises up out of the soil with the seed-shell adhering to its point, and remaining there till all the nutriment packed away in it has been absorbed. A hundred examples of this mode of sustenance may be observed when a sowing of onion seed begins to point above ground, and as the coats of that seed are perfectly black and by no means small, the most incurious gardener cannot help noticing them. Such provision, made inside the seed-coats but outside the embryo plantlet, is called "endosperm." In the chayote, by an almost unique arrangement, cotyledons are present, but the whole mass of the fruit, with largely developed seed-coats, is fused together with them, and functions precisely like endosperm. It is probable that this singular arrangement is a provision to secure the multiplication of the species by helping it, as it were, to plant itself. A cucurbitaceous plant with only one seed in each fruit would run a great risk of extinction, if such seed were no bigger than that of a cucumber or a pumpkin. But the chayote, rambling over bushes and low trees in its native habitat, is holding up in the air, a dozen feet above the soft leaf-strewn soil, hundreds of its big heavy fruits, each with the radicle just projecting from the tip, as from the rounded end of a pear. The wind rustles through them—down they drop, three or four at a time, with a thud quite sufficient to set them upright and bury the radicle-end inch deep in the soil and leaf mould. That is quite enough for the chayote. The root-system pushes downwards; up goes the wiry scrambling stem, piercing the interstices of the overshadowing bushes and pushing over towards the light, with a certainty and swiftness assured by the great lump of endospermic and cotyledonous food-material provided in the fruit for them to draw upon at need. It is quite possible that by reason of this very peculiar provision something more than a nutritive utility may be secured. It may be that the fruit, sitting as it were around the collar of the young plant, may serve as a reserve store of moisture and assist in carrying the chayote over a period of drought to which its native habitat may have been subject. This is the more probable in that a huge tuberous yam-like root is formed in the plant's second season, and Nature's way of meeting the untoward conditions of drought is to hide the menaced vegetative life in a tuber, a bulb or a fleshy rhizome under ground, there to lie dormant till better and moisture conditions prevail.

There are several other matters which might be suggested here, but enough has been said to show that it would be worth while to grow and observe the chayote as a curiosity of adaptation even if it did not promise a table delicacy besides.

VITALITY.

It is often forgotten, or perhaps one should say, it is often never noticed that the keeping qualities of fleshy fruits and vegetables are entirely dependent upon the lengthened vitality of the protoplasm of the cells out of which they are built up. Why do fruits decay? For the same reason that animal flesh decomposes and putrefies; that is, because its cell-contents are no longer alive. So with vegetable cell-contents. So long as they are alive, death and consequent decay are staved off. Therefore the useful and commercially valuable property of "keeping" depends just upon the length of time the protoplasm within the cells can retain its lowly life. Nor should this be surprising since we are accustomed to store seeds, with an embryo in each, for whole years, and then expect them to work up from a dormant life to vegetative activity when we sow them. Surely their protoplasm has been quietly alive all the time. But the chayote seems to be the only instance of a fruit which normally continues alive after the germination of the seed within it and after separation from the parent plant.

Perhaps the only obstacle to the exploitation of the chayote as a commercial product will be its readiness to germinate. It is not yet clearly known what are the conditions which determine its germination, but it is probable that adequate dry storage, coolness, and absence of light will together prolong the dormant state sufficiently for all practical purposes. Dr. Edward Palmer, quoted above, reports that in Mexico it is considered quite easy to preserve the fruits "indefinitely" by packing them in dry sand. Perhaps the word he used may only mean from gathering to planting time. But this surely would be enough, for the chayote's specialty is to come to table when the somewhat similar vegetable marrow is a thing of the past, and there is no temptation to do other than sell it out of hand. It is the usual practice to let the enclosed seed push out its hypocotyl a little before planting, and to lay the fruits out on shelves in a seed-store or other cool place of uniform temperature till they show this readiness for the garden border. Dr. Trabut states that the Algerian fruits sent to London and Paris bear shipment well, even when eight or ten days on the journey, and remain for a long time in marketable condition.

History and Comments.

The first European account of the chayote is that of Francisco Hernandez, who spent seven years in Mexico in the fifth and sixth decades of the sixteenth century and wrote voluminous memoirs in Latin upon the country, its people and natural history. He seems to have had under observation one of the sub-spinose varieties, and is not very enthusiastic about it. His note is as follows:—

Of the Chayotli or Plant bearing Fruit like Hedgehogs.

> "This is a twining genus common in gardens and cultivated lands, and is adapted for creeping. It makes a large oval fruit with a smooth skin and including a sort of acorn, almond or bean. The stems are long, slender, and cling by means of tendrils; the leaves are angled at intervals and are somewhat like those of the grape vine or the gourd. The fruit is cooked and eaten, and is everywhere for sale in the markets. The bean inside resembles cooked acorns in taste; the rest recalls something of marine origin, say roasted oysters, and has a suggestion also of the sweet-potato and chestnuts. There is nothing at all injurious or unpleasant in it as food, nor is there any other use made of the plant as far as I have been able to ascertain."

Thus it is clear that, according to this most reliable and earliest of the Spanish writers on Mexican affairs, the chayote was in common cultivation and use among the Aztecs. Patrick Browne, the historian of Jamaica, has something to say about it, but he probably knew nothing of Hernandez's account, which lay *perdu* in MS. for two centuries, and was published in 1790. He says:—

> "The plant is now cultivated in many places in Jamaica and grows very luxuriantly in all parts of the island, especially in the cooler mountains, where the vines are always observed to run and spread very much. The fruit is boiled and served up at table by way of greens, in which state it is generally looked upon as wholesome and refreshing, but it is too insipid to be much liked. The apples serve to fatten the hogs in the mountains and inland parts, where the plant is mostly cultivated."

As to the insipidity and poor opinion of its comestible value, the worthy Doctor must have expected that, being shaped like a pear, it ought to taste like a pear, or else must have had it served up with some of the water in which it was boiled as the only sauce. Even the valued Elector, Turban, or Cup and Saucer Squash does not appear at table with the appropriate *sauce béchamel*, and if Browne's cook had known the elements of his art we should have had a different story and the chayote would have been more justly appreciated.

Browne says the West Indian name for the fruit is "chocho," and unfortunately that nigger corruption of "chayote" has been naturalized in Queensland. De Candolle, in his *Origin of Cultivated Plants*, p. 274, rightly credits the West Indian coloured peasant with the manufacture of this perfectly unnecessary variant. We have some experience at the Cape of the facility with which a fine old Platt-Deutsch speech has by Kombuis chatter been converted into a patois, and it will be just as well if we decline to follow Sambo in saying "chocho" instead of "chayote" or "christophine." The exclusive use of a slightly altered word, "tayoté," in Porto Rico seems to be at once an evidence of its foreign origin and of its early introduction into the island; for the aborigines of Porto Rico were certainly more advanced than those of the neighbouring islands, and the native names are better preserved.

Jacquin, in his *Selectarum Stirpium Americanarum Historia* (1763) figures the plant in one of its sub-spinose fruited varieties, and says it was in daily use on the tables of the Cubans of the eighteenth century as an ingredient in soups, stews and other dishes. There were, he says, two varieties, the more common one being about 4 inches long and more or less furnished with soft projections like spines. This was simply called "chayote." The other was smooth, about the size of a hen's egg and much less common. The name of it was "chayote frances." Also Jacquin seems to have thought that the plant was native as well as generally cultivated in Cuba. But he gives no reason for the assumption.

Ever since the Spaniards and the English met with this plant in Mexico and the West Indies, its culture has been slowly extending. At present it is known throughout tropical America, and has long been established in Madeira, where English travellers often become acquainted with it. It is in cultivation in the Azores, whence fruits have been sent to England. Why the plant should become popular in the Portuguese Atlantic islands and yet remain unknown in the Spanish Canaries, which are seemingly in much more direct communication with Mexico and the Spanish West Indies, is somewhat difficult to explain. It is well known and appreciated in the Mauritius, where it is called the christophine, a name also used in the French island of Martinique. Kew has sent it to various parts of India, to St. Helena, and elsewhere. In South Europe and Algeria it bids fair to become a common object of culture, and the United States Government contemplate introducing it into Hawaii and the Philippines. Its absence from the latter islands, so long under Spanish dominion, is somewhat curious. But in the history of the Spanish foreign possessions, it would appear that species capable of easy propagation from seed were freely exchanged, bnt tropical plants, whose seeds are short-lived and not easy to transport, were neglected. It was too much trouble to send living plants and reproduce them by cuttings. Only a very few of the numerous East Indian varieties of the banana, for instance, appear to have reached Spanish America.

Under ordinary garden conditions the cultural requirements of the chayote are only two in number: a sheltered situation and a large trellis to climb upon. It will not actually refuse to creep like a melon plant, but the results are never satisfactory. Like many Cucurbitaceæ it is very susceptible to injury from the wind. It is the universal practice to plant the whole fruit, large end downwards, without attempting to detach the seed portion, and this seems only to be following out the indications furnished by its structure. No experiments have yet been made to determine the best method of planting, or whether it is desirable for all fruit to be completely covered with earth or not. Probably a shallow setting with not more than two inches of light soil above will be found best.

Although it is a tropical perennial the culture of the chayote is by no means limited to frostless regions. With proper precautions, it may be grown, wherever the soil is not frozen in winter, and if the large tuberous root be well protected, even outside the sub-tropical belt. The stem-growth is sensitive to cold and dies away at the approach of winter, but the reserve-material in the large fleshy root enables rapid growth to be made as soon as the conditions are again favourable. It has proved impracticable to raise the chayote in central France, but in the southern part of that country and in Algiers it does well and is rapidly becoming popular.

There are a considerable number of foes, both insect and fungous, which attack the ordinary Cucurbitaceæ in cultivation. But there is no record of the chayote having been affected by either sort of scourge. It may be that the plant being strikingly differentiated from the rest of its kind may be immune to the numerous enemies which injure its kindred, and if this prove to be the case, the chayote will have a distinct advantage as an exceptionally safe crop.

Very different opinions as to the value of the chayote for food have been expressed, some writers reporting it to be insipid, while others have compared it to the vegetable marrow and have pronounced it superior thereto. The whole controversy is a question of cuisine, or one may say, of the sauce in which the vegetable is presented. Eggs without salt, beef without mustard, and salad without vinegar might just as rightfully be condemned on the ground of insipidity. Of course the fruit must be taken for the table when young; the old fully grown ones, like all similar vegetables, are more or less stringy and tough. Whatever can be done with the best summer squashes may be done to better account with the chayote. In Jamaica it is often treated as a fruit rather than a vegetable accompaniment to roast or boiled meat, and is converted into puddings or tarts with sugar and lime-juice even as apples are used. Since there is a greater variety of fruits than there is of vegetables, this custom seems to be a mistake. Dr. Trabut believes that as soon as its table merits are known it will become a general favourite and appear to much the same good purpose as sea-kale, asparagus, artichoke and the like. He says that before any special preparation it should be kept in boiling water for about an hour.* The leathery skin can be detached easily and the vegetable shows a white flesh like that of a boiled turnip or knol-kohl. It may then be cut in slices and sent up with any suitable kinds of sauces just as is done with the small squash. It is scarcely likely to be open to export to Europe even if it obtained recognition and regular culture at the Cape, seeing that it would be apt to push out its rootlets during the voyage and become thereby less inviting and saleable.

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* We have found that young examples are sufficiently boiled in about forty minutes or a little over that time.—ED.

Let it be sufficient, therefore, to take it as a novelty for our own table, and encourage its presentation on our markets till it becomes known and valued by everybody as it deserves.

P. MacOwan,
Government Botanist.

ENTOMOLOGY.

The Maggot Fly: Myiasis.

Auchmeroyia (Bengalia) depressa, Walker.

Mr. Claude Fuller, F.E.S., Government Entomologist, Natal, has contributed to the *Natal Agricultural Journal* the following interesting paper on the human parasite bearing the above unsavoury name, He says:—

The fly has made an early appearance this spring, authentic specimens having been sent to me by Stock Inspector W. C. Robbins from Umhlali during November.

I have not previously discussed this particular pest in these pages, chiefly because there are so many points to be cleared up with regard to its natural history, that one could not feel satisfied to give an account of the insect without elucidating some of these. It now, however, appears the wiser course to make some mention of the fly, in order that those who have the opportunity of observing it and its habits will do so more critically than hitherto, and really try to discover the truth without taking anything for granted.

The pest, which we call the "maggot fly," belongs to a group of two-winged flies known as the *Sarcophagidæ*, the members of which are more commonly spoken of as "flesh flies," because the eggs are laid upon dead animal matter, and the young or maggots feed therein.

Many of the *Sarcophagidæ* are viviparous, that is, the young are born in an active state, the eggs being hatched in the maternal abdomen; a well-known instance of this is the common blow-fly, which, in a general way, resembles the maggot fly, though not belonging to the same sub-family.

Some of the *Sarcophagidæ* are parasitic in their younger stages upon locusts and other noxious insects, the eggs being deposited upon the bodies of these hosts and the young larvæ eating into the tissues through one of the joints between the segments. These larvæ or maggots feed upon the internal tissue of the locust and so destroy it. They are, therefore, looked upon as beneficial insects, and in certain parts do much to keep under destructive species. Another fly which also belongs to this group is the adult form of the "screw-worm." This species has the habit of occasionally depositing its eggs in the nostrils of mammals, and even human beings, and the maggots which hatch perforate the tender membrane, causing horrible sufferings, and at times death. A number of flesh flies also deposit young in wounds, and the maggots develop there; one instance of this kind came under observation last year.

The maggot fly is not restricted to Natal, but it is also known further up the coast, and has been recorded from Delagoa Bay, and forms the subject of several notes by various writers, and has been commented upon in the transactions of the South African Philosophical Society by Mr. L. Peringuey, the well-known Entomologist at Cape Town. Similar cases of Cutaneous Myiasis are also recorded from the Senegal, the fly being called the Cayor fly (*Ochromyia anthropophaga*, Blanchard).

The specimens collected for me last season were kindly determined by as pecialis tin this respect, Mr. D.W. Coquilett, of the Entomological Division of the United States Department of Agriculture. Mr. Coquilett referred the species to *Auchmeroyia depressa*, Walker, or, as it has been more generally termed in other writings, *Bengalia depressa.*

So far as the attack of the fly is concerned, I think it may safely be said that last season alone there were some hundreds of patients who passed through the hands of various medical men and who suffered from this form of parasitism to which the term "Myiasis" has been applied.

For my own part I have met two or three dozen parties who suffered, though I was always too late to see more than the scars left after the maggots had escaped.

In one case a child under six months of age had had between 20 and 30 taken from the scalp, and in the majority of cases this seems the part most subject to invasion. In other cases the cartilaginous portion of the nose was attacked, and maggots were commonly found in the skin of the chest, stomach, back, arms, buttocks and legs. In another case the finger of a baby was invaded, and two cases of attack in the scrotum were mentioned to me by reliable witnesses.

In no instance have I had any direct evidence of natives suffering from the pests, but I have reared flies from larvæ taken from the body of a coolie. Dogs and rabbits also suffer from the same parasite.

The range of the fly seems limited to the coast and no further inland than an elevation of 1,000 ft. It is common from the Tugela downwards, being particularly abundant about Verulam and Durban last season, and not so much south of the Port.

There is a general opinion that more than one species exist which have this unfortunate habit, and whilst this is possible I am of opinion that, upon the whole, the trouble arises from the species named above. I am led to make this remark because a number of writers to the daily press insist that any large brown fly is a dangerous one. Such an assertion at once detracts from the value of any statement such writers may make, as it shows too hasty judgment and a habit of jumping to large conclusions upon small evidence. I take it that the better course is to advise householders that (as the flies can only be determined with a certainty by a specialist, and then only after a minute inspection) the wiser plan is to destroy every large brown fly found about the home, and particularly in the sleeping rooms.

The following is a general description of the true maggot fly, in popular words, but it is only fair to say that it will apply equally well to many species probably having nothing in common with the pests:—

Length, half an inch. Head large, eyes large and of a dark-brown colour, the face (or area between the eyes) of a light or even yellowish brown. The thorax or chest—the central division of the body carrying the wings and legs—of a greyish brown and sparsely clothed with spiny hairs. The abdomen is white beneath, and of a grey-brown colour above, except for the large light-coloured segment which is attached to the thorax. The wings are transparent, glassy, tinged with a smoky brown, and many veined, but not banded or spotted in any way. The mouth is not suited for piercing, but is spread out and of a sucker-like form, suited for taking up food in a liquid state. The female flies are not supplied with any needle-like ovipositor with which to pierce the flesh of a victim in order to deposit their eggs in the skin.

The eggs of the maggot fly, taken from the female's abdomen, are elongated and white, being about 3-50th inch in length. With regard to the depositing of eggs, and how the larvæ become encysted in the skin, I regret to say that I have no data supporting that explicit testimony which one requires before accepting individual views. In at least three directions it has been averred that the flies lay their eggs about the bedding, and the larvæ, which hatch from them, bore into the skin, one writer to the *Natal Mercury* stating that the maggots had been picked out 20 at a time, "while their bodies were vigorously flapping to and fro as they bored their way into the flesh." It is claimed that this usually happens when the victim is asleep—certainly none of my acquaintances has been able to satisfy himself as to where and how they became infested. As to how long the maggots take to mature in the flesh I will quote from notes supplied to me by a fairly careful observer who submitted them to me as a matter of personal opinion open to emendation. "When camping out last March," observed my informant, "I noticed a maggot fly in the tent on the Tuesday of one week and on the following Saturday suffered from an itching in the arm and chest. On Monday the spots had taken the form of blind-boils, with a black speck in the centre of each. A week later maggots measuring one-third of an inch were expressed from the 'boils.' The fly observed was caught, and living maggots exuded from the abdomen when squeezed."

Full-grown maggots from which adults have been reared by placing them in sand are of a white or dirty whitish colour and much besprinkled with minute black spots which, as a matter of fact, are really spines. They measure about ½ an inch in length, and at least one moulted skin has been exuded from a "boil" with a maggot.

The pupa resembles that of any ordinary fly of the size of this, being stout and oval in outline. It is of a dark purple colour and, as a rule, covered with a mealy coat.

The "boils" or swellings caused by the presence of the maggots in the skin are naturally a source of discomfort, but in the majority of cases little pain seems to accrue from them. I have, however, met individuals to whom the attack has proved most painful. After the maggots have been exuded from the skin the affected part usually heals rapidly, especially if the hole is treated with a little antiseptic. The scar, however, remains quite a conspicuous mark for months, but whether it is permanent I cannot as yet say.

DAIRYING.

Stall Feeding for Milch Cows.

Apropos of the above subject, which is creating some interest just now, we have culled the following interesting information from *The Agricultural Gazette of New South Wales* for June, 1892 :—

As regards what has been found sufficient ration for particular cows of about 10 cwt. each, and about 24 lb. of milk daily, we cannot do better than give a brief abstract of the report on the experiments carried out in the spring of 1886 at Sudbury (Eng.), the full report of which is to be found in the proceedings of the Dairy Conferences and Excursions held in Derbyshire, compiled by Mr. D. Young, and sold by the British Dairy Farmers' Association, and which the reader is advised to obtain.

LORD VERNON'S EXPERIMENTS.

The experiments instituted by Lord Vernon at Sudbury in 1886 were placed under the direction of a committee of members of the British Dairy Farmers' Association.

The object of these experiments was to discover :—

1. What is the smallest quantity of food upon which stall-fed dairy cattle can be successfully and economically kept?
2. To what extent does a further supply of food repay its cost in the enhanced value of the milk?
3. What relation should the constitutents of the food have to each other to produce (*a*) milk, (*b*) butter, (*c*) cheese?

Thirty of the best milkers in Lord Vernon's herd were selected. Their average milk yield to the end of January had been 27 lb. milk per cow per day, having been in milk on the average about eleven weeks. The cost of food to that time amounted to 10s. 8d. per cow per week, and the ration of 82 lb. contained 38 lb. dry matter.

Dates.	Lot A—10 Cows.					Lot B—10 Cows.					Lot C—10 Cows.				
	Ration.	Dry Matter.	Cost per week.	Albuminoid ratio.	Yield milk.	Ration.	Dry Matter.	Cost per week.	Albuminoid ratio.	Yield milk.	Ration.	Dry Matter.	Cost per week.	Albuminoid ratio.	Yield milk.
	lb.	lb.	s. d.		lb.	lb.	lb.	s. d.		lb.	lb.	lb.	s. d.		lb.
February 1st to March 11th, end fifth week.	66	29·27	8 11½	1·5	26·1	66	29·57	8 11½	1·5	27·9	66	29·57	8 11½	1·5	27·7
	49½	22·18	6 6½	1·5	24·6	66	29·27	8 11½	1·5	26·2	82½	38·95	11 3	1·5	26·8

In selecting the cows, due consideration was given to the past yield of milk, and the time which had elapsed since calving. As will be seen from the above table, the lots averaged to 10th March, 26·1, 27·9, 27·7 lb. of milk per cow per day. "It is evident," the report says, "from these figures, that in order to obtain uniform lots to experiment upon, it is necessary for several weeks not only to keep all animals upon a uniform diet, but to interchange the animals from week to week until the yield of each lot is uniform." Moreover, the above figures distinctly warn us that with the same food, and kept under identical circumstances, different cattle will yield very different quantities of milk.

Analysis showed that the milk of Lot B, that gave most of it, was the poorest. From the table we see that lot A, that received the smallest ration fell off in the milk yield no more than Lot B on the increased ration; hence the conclusion that the ration of Lot A was sufficient. With reference to Lot C, the committee were of opinion that the increased quantity of milk was not recompense for the extra food given; and, further, that no material change had taken place in the composition of the milk owing to the change of diet. After comparing the weights of the cattle with what they were before change of food, the committee came to the conclusion that all the extra food which had been given to Lots B and C over and above that given to Lot A had been wasted, or at most made the manure a little more valuable. "We may safely say," continued the committee, "that for cows yielding on an average 171·9 lb. of milk per week, and weighing on the average 10 cwt. each, that of a diet having an albuminoid ratio of 1 to 5, 22·18 lbs. of dry matter has proved itself in every respect sufficient."

On April 15th, the rations were altered. Lot A received 59½ lb., containing 20·69 dry matter; albuminoid ratio, 1 to 5·5. Lot B got 69 lb., containing 28·84 dry matter; albuminoid ratio, 1 to 4·8. Lot C, 75½ lb., containing 34·63 lb. dry matter; albuminoid ratio, 1 to 4·5; the cost being 6s. 10¼d., 10s. 3½d., and 11s. 5½d. per cow per week respectively. After analysing the milk, and comparing notes as to the respective yields during the experiment, the committee said that the figures showed that in spite of the great change in the nature of the food given to the three lots, in spite of the great falling off in the quality of the milk, the composition of the milk remained essentially unaltered. On page 67 of the report we find the following:—"The immense importance of the fact cannot be too strongly impressed upon dairy-farmers that an excess of food over and above what the animal can assimilate is wasted. And it seems equally evident that the power of the animal to assimilate food is not profitably increased by the excessive diet." On closer examination of the report we find that the composition of the milk was as follows:—

Solids, 12·43 Fat, 3·28

And that the average quantity yielded by each cow daily, Lot A, 24·6, and that each cow received daily—

Dry substances, 22·18 lb.; albuminoids, 2·7; fat, 1·11; carbohydrates, 11·23; ash, 1·47.

Now, Sir J. B. Lawes (page 34, table X), experiments on ensilage, 1886, calculates milk containing 12·50 solids, 3·50 fat, and taking one gallon to weigh 10·33 lb., that 7 gallons, or 72·31 lb. of milk, contain:—

9·04	solid matter.
2·64	being nitrogenous substances.
2·58	fat.
3·33	non-nitrogenous substances not fat.
0·54	ash.

We deduct at this rate for the milk yielded by the cows at Sudbury in following table:—

Ration.	Albuminoids.	Fats.	Carbohydrates.	Ash.
Required for 24·6 lb. milk	27·0	1·11	11·23	1·47
	·89	·86	1·18	·18
Leaving for sustenance 10 cwt. per day...	1·81	·25	10·10	1·29

When we come to consider that part of the ration of cows goes to form heat in the animal's body, it is evident that the less heat-producing food will be required in summer than in winter. If a cow is not in milk, she may not require more albuminoids in cold than in warm weather; but she would need more heat-producing food to keep her warm. In summer, for every lb. of flesh-formers, she will require 3 lb. of heat-producers; in winter, 5 or 6 lb. Professor Arnold, from whom the foregoing is quoted, also calculates, we believe, that cows require 33 per cent. more food in a cold stable than in a warm one, and 25 per cent. more food when uncooked than when it is cooked, for, in the latter case, it is rendered capable of complete digestion. We have known dairymen give food in a liquid form boiling hot. They say it increases the flow of milk; but, of course, it is forcing.

Digestion of Cows.

Cows are ruminants—that is to say, they chew the cud, and when the food is swallowed, it goes into the rumen or first stomach; thence it is returned to the mouth for further mastication, and finally swallowed, and then passes into the third and fourth stomachs. The first stomach is only capable of retaining coarse and bulky food; therefore, it is necessary that cows should be provided with a sufficient quantity to prevent this organ from suffering disease.

In Professor Arnold's "American Dairying" and Willard's "Practical Dairy Husbandry" very good descriptions of these organs will be found.

The great importance of continually keeping a cow well fed may be seen from the following extract from the former of the two authorities just named:—"The secretions of milk have a tendency to diminish the volume of blood by drawing upon both its liquid and solid elements. To keep up a flow of milk, this draft must be supplied by furnishing enough to restore steady waste. A failure to do this for any considerable time is not only to decrease the milk during the lack of food, but to invite a hurried contraction of the blood-vessels connected with the udder. These once reduced there is no enlarging them again till the occasion of another birth, and the supply of blood for making milk will be diminished to reduce capacity, keeping down the flow permanently, and shortening the time of its final cessation."

Dry Cows.

When a cow is being dried off, she will not require much succulent food for obvious reasons; but an occasional root to keep the bowels in good order is a good thing. We have been used to turn dry cows into a yard with plenty of good oat straw and a few roots daily, and found them do very well. On the other hand, great care should be taken to suit the food to the cow some two or three months before calving, in order that they may have proper nourishment for the fœtus and strength for the period of labour, but taking care that the cow is not then too plethoric.

Bulk Necessary in Cow's Food.

As we have before explained, cows require a certain amount of bulk in their food. Chopped hay or good chopped straw mixed with the feeding stuff will secure this.

STEAMING AND COOKING FOOD.

As to cooking food, it must be remembered that some foods are so digestible—such as early cut hay—that cooking it would cost more than than the food saved through the process, through the fact that the cost of cooking is an inconsiderable item in feeding cows, and that steaming or cooking renders food not only more digestible, but more wholesome and inviting to cattle. It is obvious it need not be further insisted on here.

FOODS WHICH TAINT MILK.

If foods are given which taint milk, such as turnips, for instance, they should be fed immediately after milking, and on no account before. If cooked, they will not injure the milk; but we never fed them ourselves except to dry cows. Parsnips are in some ways greatly preferable, and they do not taint the milk.

FOODS LIABLE TO CAKE IN THE STOMACH.

Meal, grains, or other food liable to cake in the stomach, should be given with coarse food or chaff, with a certain amount of substance containing oily matters.

FERMENTED FOOD.

Food is easier of digestion when fermentation has set in. Professor Long, we believe, is of opinion that fermented food injures the flavour of the butter.

CHANGE TO GREEN FOOD GRADUAL.

The change from dry to green food should always be gradual. Grass should be cut and fed to the cows in sheds, and, when first let out, it should only be for an hour or so at a time.

SALT AN ABSOLUTE NECESSITY.

Salt is absolutely necessary for cows at all times and in all places, either separately or in their food. Salt forms a large part of the solids in blood. They will require it specially in the spring, according to Willard, for then, he says, there is less saline matter in the pastures than at other times. An experiment tried in June, showed that, by letting cows go without salt for five days, the milk lost 2 per cent. in quantity, and 7 per cent. in quality.

REGULAR FEEDING HOURS IMPORTANT.

The hours of feeding cows are not of primary importance; but it is of the greatest importance that the hours fixed upon should be rigidly adhered to, as cows suffer greatly from want of regularity in feeding as in milking. When kept tied up all day, they want feeding four times, at equal intervals of time. Those out all day should be fed morning and evening, and, on short winter days, early in the morning, and at 4 or 6 p.m.

SOILING.

"Soiling," or stall-feeding, can be adopted either all the year round or only during the winter. The reasons adduced in favour of soiling cows are generally that it economises food, that more cows can be fed from same acreage under this system, and that the manure is better in quantity and quality.

If the question is regarded from a strictly economical point of view, we have to take into consideration the extra cost of labour entailed in feeding, the collection of the manure, and the ultimate distribution of it. Where the system is adopted we should strongly advise that the cows should be out for some hours during the day, for we cannot believe that cows highly-fed to produce excellent milk could be as healthy for as long without exercise as with it. When cows are sold as they approach a low yield of milk, this may not be so important a point; but in a herd whose calves are reared, we hold it is vital.

We must not omit to notice the fact that extra straw will be required under the soiling system, or some other litter, and that a succession of green crops should be ready for use from end of March to end of October.

WATER.

Under whatever system dairy cattle may be fed and managed, we cannot too strongly impress on our readers the utter necessity of an abundant supply of pure fresh water for dairy cattle. It is absolutely essential for them if they are to give a good yield of milk. Pure spring water is the best, and soft water may be used; but very hard or chalky water is not good, nor well water unless very pure. The water given should never be very cold; it is better to give it with the chill off. Stagnant water, and water in which there is any decaying matter, is an abomination for cows. It ought to be unnecessary to remind any one that water impregnated with sewage is poison to the cows, the milk, and the milk consumer; but we fear care to avoid such water being drunk by cows is sometimes wanting. The water, from whatever source the supply for the cattle is obtained, should be analysed from time to time by an analytical chemist, and not used if found impure. Better, far better it is to pay for good water than to use bad free of cost, "temporary cost" —be it well understood, for bad water will in the end prove the most expensive article that can be used.

It is asserted by Mr. Daniel (Willard) that any one can see that the yield of milk is directly proportionate to the quantity of water absorbed; which conclusion he has arrived at by comparing the quantity of water absorbed by various cows and their yield. He asserts, moreover, that a "cow" who does not habitually drink as much as 27 quarts of water a day, and he has met with such, is actually and necessarily a poor milker. She will give only from 5½ to 7 quarts per day; but all cows that he has seen which drink as much as 50 quarts of water daily were excellent milkers, yielding from 19 to 23 quarts per day. In his opinion, the quantity of drink consumed by a cow is a valuable test of her worth as a milk producer. Warm water increases the flow of milk.

Cows to be Kept in Good Condition all the Year Round.

Any loss of condition in a cow should be anticipated and extra food given. After a long course of milk-giving, cows are apt to fall off in condition. The fact is, cows should be kept in as good condition as possible, not only in the summer, but all the year round.

It may be useful to note here the opinion of an eminent authority, that in the case of fattening a beast for the butcher it is most economical to fatten it as quickly as possible.

Foods.

While on the subject of feeding, we will briefly consider the use and characteristics of some of the different foods, &c., given to dry cows, albeit it must be remembered that the analysis of foods varies often in different samples of the same lot.

Linseed.

Linseed will keep cows in condition, and add to the richness of their milk; but it is liable to make the butter oily if largely used.

Maize-meal and Carrots.

Maize-meal and carrots, if fed to cows, will give the butter a deeper colour.

Decorticated Cotton Cake.

Decorticated cotton cake is a very good food; but only that which is guaranteed "pure" should be used.

Two hundredweight of decorticated cotton cake ground into meal and added to 1 ton fermented straw chaff constitutes a mixture which agrees closely in composition with good meadow hay.

On poor pasture 3 lb. or 4 lb. a day of cake will materially assist cows in giving an abundance of good milk, and the manure will be enriched by the nitrogen in the cake. The manurial value of this cake is very high, proportionate to the quantity of nitrogen contained in it. It is best given crushed.

Beans and Rape.

Beans are astringent, while rape and linseed cake are the reverse.

Ensilage.

Of the expediency of making ensilage, we hesitate to express an opinion, preferring to leave our readers to form their own, either practically by using some, or from the numerous facts published about it. At the same time, we may say that it seems from the Government report that ensilage, when used, should not be given near milking-time, and that those who handle it should wash their hands before milking. As a food, given under proper conditions, and being of a right kind, it claims consideration but to what extent we cannot say.

Carrots, Mangolds, Turnips.

Carrots make better flavoured butter and milk, and more of them than mangolds, when considered weight for weight. The latter again are more valuable for fattening than turnips. "Mangolds are notorious for making thin and low flavoured, but not unwholesome, milk, like that from brewers' grains." They have a food value as compared with carrots as 7 to 9; but mangolds are raised with less labour, and will produce about 50 per cent. more weight to the acre, about 600 bushels of carrots and 900 of mangolds being the usual crop for an acre of good ground, if good care be taken of them. As measured by analysis, 5½ lb. of carrots or 7 lb. of mangolds would have a value equivalent to 1 lb. of oats. Owing to the quicker and more complete digestion, and greater efficiency of green food than dry, something less than the weight abovenamed, perhaps 1 lb. of each, would be as valuable as 1 lb. of oats. As a quart of oats weighs 1 lb., about 8 of carrots or 24 of mangolds would be a fair exchange for 4 quarts of oats. In substituting roots for oats, it should be remembered that they differ so much in composition that one cannot fill the place of the other. Oats alone make an excellent milk-producing food, being well-balanced as to flesh-forming and heat-producing matters, while roots are very much lacking in flesh-forming materials; something that will make more flesh, then, should be fed with them. Wheat, bran and middlings would help them very much, or an equal weight of early-cuthay or clover, or one-eighth of their weight of linseed, cotton-seed, or peameal. When fresh (not fermented) brewers' grains are fed with roots in equal weight, each serves to correct the defects of the other, and the two make a much better milk than either would alone.—(Professor Arnold in *New York Tribune.*)

Parsnips.

Parsnips, as we have observed, are very good for dairy cattle, and if given with hay in the winter will produce butter of almost as rich a colour as can be had in seasons when the cows are on good pasture.

Straw as Food.

The value of straw as food is perhaps hardly sufficiently appreciated. Oat-straw, pea-straw, wheat and bran straw, are all good food; but they are better steamed and cooked. A mixture of straw and linseed cake will be found a good food, and Primrose M'Connel recommends an excellent "mash" for cows in the *Live Stock Journal and Agricultural Gazette Almanack for 1887.*

Bran.

Sir J. B. Lawes, page 33, "Experiments on Ensilage," says:—"It is somewhat remarkable that the composition of bran, which has a special value in the eyes of all dairymen, bears a very close relation to that of milk in the proportion of the digestible nitrogenous and non-nitrogenous constituents, as will be seen from the following table:—

	Digestible Nitrogenous Matter.	*Digestible Non-nitrogenous Matter.*
3¼ lb. bran will supply	0·42	1·41
11½ lb. milk will supply	0·42	1·49

Brewers' Grains.

We fed them to twenty cows for eighteen months, and then abandoned their use, except in small quantities.

A New Milk Adulterant.

It is reported by the press in America that a new milk adulterant, harmless in itself but an immoral factor in the hands of dishonest milkmen, has been discovered in use by the dairy inspectors. It is called viscogen, and is composed of sugar, lime and water. It has the effect of making milk appear richer than it is, as the lactic acid in the milk turns the lime to a thick white substance that assimilates with the milk, improving its looks without injuring its taste. A sample was sent to Dr. S. M. Babcock, the inventor of the well known milk tester, and his reply in the *Rural New Yorker* is as follows:—

"Viscogen is prepared by dissolving caustic lime in a solution of cane sugar, and was first recommended by Dr. Russell and myself as an agent which could be used without detriment to health for the restoration of the consistency of Pasteurized cream, which is very much thinner than natural cream, containing the same amount of fat. In natural cream the fat globules are to a considerable extent grouped together in masses, containing all the way from two or three to several hundred globules, while in Pasteurized cream the globules are uniformly distributed. The thinner appearance of Pasteurized cream is due to this fact. It was found that viscogen caused the fat globules to become grouped in a similar way to natural cream, and that the consistency was in this way restored. The amount of viscogen required to accomplish this is very small, so that the lime introduced is scarcely more than the difference found in natural milks from different sources. Before publishing our bulletin, leading physicians were consulted regarding the sanitary effect of this addition, and, without exception, we were told that it did not injure the cream; in fact, most physicians recommend the addition of lime water to milk for children and invalids, as it is supposed to promote its digestibility. We also consulted legal authorities, and were told that viscogen could not be considered an adulteration if the consumers are informed of its use. Under these conditions only have we recommended it. The customers of the University Creamery all prefer cream treated in this way to natural cream. Wherever viscogen has been used in the manner recommended by us, there seems to be no objection either from a sanitary or legal point of view. In this respect it differs widely from the ordinary preservatives and adulterants that are added to milk. I presume, however, that in many cases unscrupulous parties have used it to deceive their customers regarding the richness of cream, and wherever this has occurred the penalty for adulteration should be strictly enforced, although no injury to health is likely to result from such practice. I very much regret that this substance, which was originally intended only to benefit the consumer, has been misused in this way."

STOCK FARMING.

Horse Breeding.

At a conference of horse breeders held at the Public Works Buildings in Sydney, New South Wales, on 17th October last, as reported in the *Agricultural Gazette of New South Wales* for November last Major-General French in the Chair, the following matters were considered, viz. :—

The establishment of direct purchasing agencies;
taxation of stallions;
award of premiums;
importation by the Government of stallions;
establishment of a State stud farm;
use of mares by the police;
exportation of mares;
formation of a Board of Advice.

Direct Purchasing Agencies.

Resolution.—"That it is desirable that the Imperial and Indian Governments should form an official agency in New South Wales, with the view of purchasing horses direct from the breeders." Carried after the following discussion:—

Messrs. Price & Creed said that Major-General Sir Edward Hutton was of opinion that under proper conditions the Imperial Government might be induced to establish buying agencies in New South Wales, and that Lord Roberts' views upon the maintenance of a permanent transport service indicated that the demand for Australian horses would be largely increased.

Mr. Morton said that the arrangements under which horses had been purchased for military purposes had not been satisfactory either to the military authorities or to the breeders. While the man who bred a good horse received a miserable price of £5 or £6 a head, the military authorities had to pay for the same animal £30 to £40. No doubt the middlemen were to blame, but then they had to buy at a risk, often of sea transport, and the condition of affairs would remain the same until the system were altered. By buying direct from the breeder here the War Office would save money and the industry would be benefited, because as soon as breeders got better prices for their stock a number of worthless stallions would be thrown out of service and greater efforts would be made to uniformly improve the breed of horses.

The Chairman (Major-General French) read a letter he had written in 1896 to General Sir George White, then in India, suggesting that an official be appointed to buy horses here for the Indian army. The Indian Government had been paying £45 per head for some time past, and it seemed to him that they could save from £10 to £12 per horse by purchasing direct. The reply he had received was to the effect that the authorities preferred, under the conditions then existing, that the breeders should send their horses to the Indian markets, where the army officials could make their selections. Since then, however, the condition of affairs had changed.

BOARD OF INSPECTION.

Resolution.—"That in the opinion of this Conference there should be inspection, by a competent Board, of stallions for public service, and the issue of certificates to approved stallions." Carried after the following discussion :—

The mover of the resolution said he thought it should be made clear at the commencement that it was not proposed to pay the Board anything beyond actual out-of-pocket expenses. Perhaps railway passes could be allowed, and the Board could visit different parts of the State once a year to inspect stallions. He proposed that, under a proper arrangement, a Board of three be appointed and authorised to recommend the issue of a certificate to stallions that, in their opinion, are fit for service. At the present time a great number of people had mares which they desired to send to a horse, and there was nothing to guide them in a decision as to the fitness, or otherwise, of the stallion. One could not be guided by the advertisements and notices appearing in some of the papers, because the newspaper people simply inserted the matter they were paid for; and even if they were not paid to puff up any particular horse, he could scarcely see how the paper, with the best intentions possible, could help the owner of a mare to a reliable decision. The effect of the motion would be to greatly benefit the small breeder, who would be able to send his mares to service without misgiving, and without the waste of time and money so frequently incurred now. As to obtaining competent men to act on the Bourd, there would be little difficulty, because there would always be found many qualified men ready to act in the best interests of horse-breeding from the mere love of horses. Before long, the withdrawal from service of stallions of standards unsuitable to breed from would result in the general production of stock of a character equal to any in the world.

Mr. W. Muggridge said he was of opinion that, in view of the importance of rejecting stallions possessed of hereditary or transmissible unsoundness, there should be a qualified veterinary surgeon on the Inspection Board. Although many experienced breeders were quite competent to express an opinion as to the suitability of a horse for breeding, so far as standard was concerned, there were really not many men in the country who could pronounce definitely upon the freedom of a horse from hereditary unsoundness.

Hon. F. B. Suttor, M.L.C.: The owner of a horse not serving mares for the public need not submit his entire for inspection. In England, where premiums are awarded to stallions for public service, the inspection is by a veterinary surgeon, and if a horse is found to be affected in any way with hereditary unsoundness he is cast out and not allowed to serve mares in England.

Mr. Price, M.L.A., explained that the object of the resolution was to provide for the issue of a certificate, so that the man obtaining the services of a stallion will know exactly whether he has passed the necessary Government inspection.

Mr. A. A. Dangar said the matter under discussion had been before the public for a great many years. He had written himself about a tax on stallions long ago, but had given the matter up because he was told that he was interfering with the rights of the poor man. We do not want to interfere with the rights of the small owner; but every small owner should not be allowed to keep what he likes if the breed of horses is to be improved. At the present time there was a good opportunity for establishing a large trade in our horses, which had already won good opinions in South Africa and elsewhere. If that trade was to be maintained, the object would be to produce a better class of horses and to encourage people to take them at a better price if possible. He was perfectly in accord with the resolution.

TAXATION OF STALLIONS.

Resolution.—"That a tax be placed on all stallions placed on public service."

Amended.—"That the tax be imposed on all stallions of 3 years of age and upwards." Carried after the following discussion:—

Mr. A. A. Dangar: The question of a tax on stallions is one that we have all heard of for a long time, and upon which all breeders who desire to see improvement in horses feel strongly. Discussion of the subject, even if we do not pass the motion now before us, will be productive of good.

Hon. F. B. Suttor, M.L.C.: There should be a tax on all entires. The object of taxing stallions is, that from the funds obtained you should pay subsidies to stallions that are placed at public service at only nominal fees. In England they give £200 subsidy on a horse, on condition that he serves farmers' mares for a fee of 30s. or £2. The animals receiving the subsidy are of an approved class. Owners of good horses in New South Wales would willingly pay a tax on every entire they had, although those horses are not at the service of the public. If the owners of all entires were taxed at a reasonable rate, the result would be that an enormous number of worthless sires would be operated upon, and a number of those who have not horses at public service would willingly help those who have good stallions, and are serving the public at a reasonable fee. The tax should be applied at a capable age. The subsidy would be for the services of the farmer, and not for the racing class of horses, and we would therefore soon have a very large fund to help the subsidies. It was proposed to subsidise only those horses of which the Government approved.

Senator Millen supposed there was not a gentleman present at the conference, the owner of a horse, who would imagine for one moment that the tax would have the effect of castrating his horse. Those who were present were proposing to tax for the eradication of some one else's horse. It was proposed to impose a tax which would tax the stallions of the people who were not present at that meeting. He had never yet met a man who would admit that his horse was not fit for service. He would like to know what breed it was desired to improve? The class of horses to be improved were what they all wanted to know about. He wanted to show that we had not got the type of horse in New South Wales to-day. The very class of horse we want to breed does not exist here, and by taxing the present breeders, the new type that we want to see bred here would not be produced. He admitted that the effect of the imposition of the tax would be to destroy inferior stallions, but there was nothing about the improvement of horses in the resolution. The whole question rested upon the breeding of horses of a class that would sell abroad. That class of horse did not exist here to any extent, if at all, at present, and it was desirable to see how best it could be produced, at something like £15 a head. He hardly knew a horse suitable for the purpose, whose services could be obtained for £5 (Voices: Heaps of good horses). If that were the case, it showed that there was no need to impose a tax. The imposition of the tax would be merely to enable the owner of the better class of horses to charge a higher fee. But there was no use in paying from £5 to £10 for the services of a horse, when you stood a chance of getting only £10 to £15 for the progeny. There had been a very serious deterioration in the breed of our horses. Racing was said to improve horses. He thought racing had damned the breeding of horses. The universal love of the racing machine had caused people to lose sight of the improvement of horses for useful purposes. The best opportunities before horse-breeders here lay in the breeding of horses suitable for export, and it was a question for breeders whether they would try and supply the demands of the market as it existed. The effect of breeding what the buyer does not want is disastrous; breed what the buyers want. For years attention has been concentrated upon the production of light, speedy animals.

Mr. J. R. Smith: Our horses are better to-day than ever they were. The horse of to-day, straight off the grass, will do anything that horses ever did.

Senator Millen: But we have not the market to-day for the class of horse that is being bred. The swift, light racehorse cannot afford to have the action that is essential in the hack. The racer must go lower in the gait to get over the ground quickly. The shape of a thoroughbred is not the same as that of a hack. You want your horses closely put together. Even if the inferior thoroughbred were taxed clean out, it would still be necessary to breed from the superior thoroughbred racehorse; but that is not the class of horse required at all. We want a different class of weight-carrying animal, with different action. A tax on stallions would not stimulate the horse-breeding industry. Had the tax been in existence for twenty years it would not have affected the industry in any way. Thirty years ago a thoroughbred sire was a good horse to breed from, but in that time, in the production of the racing machine, the essential qualities now in demand had been lost. No one would use an inferior animal where a better one is available. The great bulk of the horses are now bred by farmers and graziers who do not make a business of the matter. It was proposed to subsidise stallions. To which were the subsidies to be given? Was it proposed to tax the farmer and grazier and stationholder who bred a few horses for his own use, to give a subsidy on a stallion which might never come into his district, perhaps never within hundreds of miles of his place, but just to enable somebody somewhere else to get the services at a low fee? Every station will have to pay a tax, and yet they are invariably breeding from the wrong class of stallion. Invariably it would be found that the sire in use is of a racing strain. That sort of thing wanted remedying, but he could not see how the tax was going to do it. If all the inferior stallions were removed, would it not place the whole business in the hands of the owners of the superior stallions, who would increase the scale of fees?

Mr. P. H. Morton was strongly in favour of the tax. It was important in the interests of horse-breeding that the use of worthless stallions should be checked. He had known of instances where, in default of a fee, the services of a stallion were given for a bag of maize or a pair of ducks. The tax in its operation would throw out of service a number of worthless sires that now travel the country. And when the inferior horses were got rid of, the farmer and small breeder would be able to get the services of first-class sires if the Government would grant *King's Premiums* as they did in England. He did not think any owner of a good horse would object to the tax, seeing that the effect of it would be to raise the standard of horses bred throughout the country. People from all parts of the world coming here to purchase would find horses of average good quality. So far as he could see, the small man would be most benefited by the tax.

Mr. C. H. Dight, M.L.A., thought the meeting would do well to reject the amendment. There was a great deal in what Mr. Millen had said, and he concurred with him as to the small amount of good a tax of this nature could do in producing the class of horses best adapted for military purposes. If the tax were limited to stallions placed at the service of the public, it would be going quite far enough.

Mr. A. A. Dangar: If this tax is not put upon all stallions, the whole object we are driving at will be negatived. Unless all stallions were treated alike, there would be a danger of inferior sires being offered at low prices. The tax might be a graduated one, so as not to unfairly burden the farmer who wishes to send a mare or two to service.

PREMIUMS TO SUITABLE STALLIONS.

Resolution.—"That the Government be requested to give premiums to suitable stallions placed at the service of the public at a reasonable fee." Carried after the following discussion :—

Mr. P. H. Morton said: By the granting of the proposed premiums, the owners of excellent horses would be encouraged to place them at the service of farmers and small breeders at very low fees. It seemed unnecessary to say anything as to the great advantage such a system would be to all concerned. When the farmers could be sure of obtaining the services of superior horses at low fees, they would no longer patronise cheap, weedy stallions.

Senator Millen suggested that the premiums should be limited to stallions suitable for getting horses of some particular class.

Hon. F. B. Suttor: Why not encourage the improvement of horses for general farming purposes? Any steps that are taken should be made with the object of general improvement.

IMPORTATION OF STALLIONS.

Resolution.—"That it is desirable that stallions suitable for getting general purposes horses should be imported by the Government of New South Wales for use within the State." Negatived after the following discussion :—

Senator Millen thought the Government should spend about £10,000 in the purchase of perhaps twenty English horses at £500 each, so that they could be leased to approved persons each season, with the provision that the lessees should sell the services of the stallions at a reasonable fee. It had been claimed that the big racing clubs aimed at improving the breed of horses, but racing had done more to ruin horse-breeding than anything else. It was the use of these frail thoroughbreds that had been responsible for the deplorable deterioration of our light horses, and it was necessary to import stallions that would impart the strength and substance that were lacking in our studs. The Continental Governments had found it necessary to improve their horses for military purposes, and had purchased stallions in England for this reason. If this State relied upon the racehorse to produce military remounts, the breed would get weaker and weaker.

Mr. W. Muggridge said that the thoroughbred was undoubtedly the best sire to use, either for light horses or for crossing with the heavier breeds; but the trouble was that they had been using racehorses, which, like racing yachts, were designed only for speed, and were not built to carry cargo. It would be urged that the Government should not interfere with private enterprise; but, of late years, every thoroughbred imported from England was intended to get racehorses, which, as a rule, had fashionable pedigrees and bad legs. What was needed was the stout, good-legged thoroughbred, which, owing to unfashionable breeding, was too slow for racing purposes. In Ireland, where this class of horse was used to breed hunters, they could be procured cheaply enough.

In answer to an interjection that "the Irish hunting stallion is a crossbred horse," Mr. Muggridge said such was not the case, for, although crossbred mares were used, the sires were thoroughbreds.

Mr. J. Pottie said that something should be done for the little farmer in districts where there were few stallions, and he would suggest that the word "purchased" be used in the resolution in place of the word "imported."

Mr. Dight was against the importation of any kind of stock by the Government. Whenever there was a demand for good stock there was always private enterprise sufficient to enter upon it and supply that demand.

Mr. A. A. Dangar said that it was not possible to get a good class of horse in England except at a high figure, and it would not pay to import them for the low fee people wish them to stand at.

Colonel Bayly thought that there were horses enough in the State, for military buyers had told him that it was easier to buy horses now than when the war first started, and it was a surprise to them where they all came from.

Mr. McIvor: If there were no need of importing horses, it was remarkable that it had taken the military buyers two years to find 16,000 horses.

Hon. George Lee was opposed to the importation of stock by the Government. It would get the Government into difficulties, for they would be pestered with demands from people who wanted all kinds of things imported. He certainly thought from his own knowledge that the breeding of horses for all military purposes must be from the English thoroughbred horse. Some very light ones of the breed were used for racing purposes, but there were plenty of the right sort to be obtained at a reasonable price in England; yet he did not think the Government should import.

Mr. R. H. Dangar said that if the Government thought it necessary to purchase stallions, they could get plenty here.

The Chairman (Major-General French) said he would like to have a word or two on the subject. He had found, when inspecting the mounted corps in the country, that the majority of the horses used were not fit for cavalry, and many that had been sent to South Africa were fit only for mounted rifles. The mounted riflemen only needed horses to carry them from one point to another on the march, for the men dismounted when they had to fight. The cavalry horse was asked to carry 18 stone and gallop into action. In developing that sort of horse they wanted speed and substance, and if the producers would undertake to breed them, a regular market could be had in India for this horse at £45. The market in South Africa must be very large for some time to come. They have thoroughbreds in England 17 hands high and 7 ft. round the girth. He thought that too much attention was given in this State to anything that would run a mile, and they could not expect that horse to carry 18 stone.

ACQUISITION AND SALE OF MARES BY POLICE DEPARTMENT.

Resolution.—"That in the opinion of this Conference the Police Department should, all conditions being equal, purchase mares, and, after using them for a term of years, sell them by auction." Carried after the following discussion:—

Mr. Price, M.L.A., said: It was a well-known fact that the police were in a position to select in the various districts the very best horses available, for they had opportunities of learning almost as much about the animals as the owners themselves, and if the Government bought mares for the service it would, perhaps, keep good ones in the State.

Mr. P. H. Morton said that it was a deplorable sight to walk along the ranks of the contingents that left for South Africa and to see the number of splendid mares that were either destined to be shot or starved to death.

Mr. J. R. Smith: If they bred on the right lines their fillies ought to be better than their mares. If it were not so, they were going back. What was the use of selling good mares for others to gain the advantage? He found that breeding police horses did not pay. The thoroughbred horse was the right stallion to breed from. He had used a horse called Prodigal, a stallion not fashionably enough bred to produce racehorses, but a decided success in getting police horses. The stock of this sire had gained such a name that the police in the end took every animal he could breed, without inspection, at £12 10s. per head, and eventually they bespoke them all at 2 years old. Yet that price did not pay. He had given up breeding this class, for he was not going to sell at £12 10s. when, by going in for the production of racehorses, he could command £60 apiece for yearlings. Breeding remounts at even £15 per head did not pay. If you wanted to breed racehorses you must stick to the racing type, and if you wanted to breed hacks you must stick to the hack type of thoroughbred, for each was equally unsuitable for the other purpose. It was just the same as in Shorthorn cattle, for if you wanted the milker you did not breed from the beef type.

Mr. R. H. Dangar said that he saw an article the other day written in a paper got up in 1883. It gave the opinions of fifteen or twenty breeders in England, and every one of them drew attention to the fact of good mares going out of England year after year, and the Continental buyers mopping them up.

Colonel Bayly said that, as remount officer in South Africa, it was his duty to do business with the local farmers there, and nearly always when he offered them receipts for purchases they would ask to be allowed to go along the lines and choose a mare or two as payment.

Resolutions.—(1.) "That the Federal Government be urged to discourage the exportation of good mares."

(2.) "That the New South Wales Government endeavour to induce the Indian and Imperial Governments to establish direct purchasing agencies in this State, at fixed prices for each class required."

As to resolution No. 2, if the small farmer and breeder could rely upon getting a certain price for a horse of the right stamp, he would not hesitate to go about the best way of breeding, and the object of this resolution was to offer this encouragement.

Both resolutions carried, as was also the following:—

"That a Board of Advice be appointed to assist the Government in carrying out the resolutions of this Conference."

The Chairman (Major-General French), and Messrs. Price, M.L.A., Smith, Dangar and Muggridge laid before the Premier (Hon. John See) the resolutions of the Conference.

The Premier said that for some time past he had recognised the necessity of doing something to improve the breed of horses in the State. He was, therefore, thoroughly in accord with the resolutions passed by the Conference, which, he noticed by the list of names submitted to him, was a most representative one. He would at once hand the papers to the Minister of Agriculture, to whose department the business really belonged, and he felt sure Mr. Kidd would do his best to improve the conditions of horse-breeding.

APICULTURE.

Do Bees obtain Honey from Corn (Maize)?

An interesting controversy has appeared in the *Agricultural Gazette of New South Wales*, in which Mr. Albert Gale undertook to prove that bees do not obtain honey from corn, and Mr. W. Hessel Hall, M.A., produces evidence of an affirmative nature. We here publish the latter paper. Mr. Hall begins by saying:—

Mr. Gale discusses the matter from a botanical point of view, and proves to his own satisfaction that corn cannot, and therefore does not, produce honey. In this article I purpose dealing with the question as a matter of evidence and fact, and will endeavour to prove that corn does, and therefore can, yield honey.

I am aware that maize belongs to the anemophilous or wind-fertilized group of plants, and that a great weight of authority can be quoted against me in regard to this class of plant, but authority is not infallible, and the question is one to be decided by the facts of the case and not by theories of what ought to be.

I am also aware that maize belongs to the class Monœcia, and that it has stamens and pistils (ordinarily) on separate flowers in the same plant, the cob representing the female flower and the tassel the male flowers. I use the word "ordinarily" because I believe there are exceptions to the rule. Mr. Gale says "no one would ever think of looking for grain at the top of the stalk, there they would find pollen only." Now as a matter of fact grain is sometimes found at the top of the stalk. The writer has repeatedly seen the plumes of the tassel covered with well-developed grains of corn right to the top of the plant, such grains not being covered with a husk as in the cob. This peculiarity is more common in some varieties than in others. It may be observed sometimes in a crop sown broadcast, or in individual plants, whose cob has proved barren or has been destroyed by injury. Now, on Mr. Gale's own principle—"No hen, no ovaries; no ovaries, no eggs"—it would appear that there must be partially developed female organs among the male flowers on the tassel, otherwise there could be no grain on the tassel. These facts are undoubted and have repeatedly come under my own notice. If, then, the male flowers on the tassel contain rudimentary female organs, then Mr. Gale's whole argument *re* the impossibility of maize flowers producing honey must fall to the ground. But apart from the presence of rudimentary female organs on the tassel, why should it be incredible that the male flower should secrete honey? I have not seen bees visit the beard and cob, but am satisfied that they get large quantities of honey out of the male flowers on the tassel. In the case of the pumpkin, Mr. Gale admits that the bees visit male and female flowers alike. I know the bees get honey from the male flower of the pumpkin, because I have seen the honey at the bottom of the flower at the base of the stamen, and have watched the bees collecting it. If the male pumpkin flower secretes honey, why not the male flowers on the corn tassel?

Mr. Gale contends that the honey in flowers is secreted at the base of the petals, and proceeds to assert that "maize has no petals, and, therefore, it has no honey glands or nectary." If this logical proposition is correct, then the following ought to be true, as the mature flowers of the eucalyptus families have no petals. Honey is secreted at the base of the petals. The flower of the "Yellow Box" has no petals, therefore it has no honey gland or nectary, and can secrete no honey. What do the bee farmers of New South Wales think of arguments like that? The trouble is to be found in the premises in which Mr. Gale, relying upon botanical generalization in regard to a class, assumes the very thing to be proved. But if we admit that the cob has no petals, is this true of the male blooms on the tassel? Without a further examination of the blooms, I am not prepared to admit that they have no petals. But in any case, Mr. Gale admits that "the petals are a modification of the stamens," so that there is no reason why honey glands should not be found at the base of the stamens in the maize bloom as they are in the bloom of the eucalypts.

Running through the authorities quoted by Mr. Gale is the idea that wind-fertilised flowers are independent of insects, and therefore are inconspicuous, have no honey, and hold out no inducements to insects to visit them. But I am satisfied that insects play an important part in fertilising many wind-fertilised flowers, by disturbing and shaking down the pollen on the female organs, and in effecting cross fertilisation (especially with maize) by carrying the pollen to and from plants growing at a distance. And even though botanists may have failed to find honey in these flowers, yet where the insect does a service one may expect to find that he does no go without his reward. Without his wages the bee won't work, and I have noticed that when the maize does not secrete honey (as happens some seasons in unfavourable weather) that the yield of grain is light and the cobs are barren, or but poorly filled. When the botanists divided all flowering plants into wind-fertilised and insect-fertilised flowers, I am afraid they drew the distinction much more sharply than Mother Nature has done. She has grades between plant and animal, bird and reptile, bird and mammal, and I guess she has grades between the wind-fertilised and insect-fertilised flowers. Mr. Gale half apologises for the fact that the bee visits the maize-blooms at all. He only does it, Mr. Gale assures us, because he is hard up and short of pollen. But that is not true. For the bee visits the maize tassels just as greedily when the angophora, the grey gum, or the bloodwood are in bloom, and when the whole mountain is white with pollen-covered tree tops. The bee needs no apology for his visit. He works not to fertilise the maize (though he does that by the way) but he works for his wages, honey; having a good enough nose to find it where Mr. Gale and the botanists say it ought not to be and cannot be found. From Darwin's "Origin of Species" Mr. Gale quotes these words, "Flowers rank among the most beautiful productions of Nature; but they have been rendered conspicuous in contrast with the green leaves, and, in consequence, at the same time beautiful, so that they may be easily observed by insects. I have come to this conclusion from finding it an invariable rule that when a flower is fertilised by the wind it never has a gaily-coloured corolla. Plants habitually produce two kinds of flowers, one kind open and coloured so as to attract insects, the other closed, not coloured, destitute of nectar, and never visited by insects." "Maize is one of these latter," says Mr. Gale, "and therefore produces no nectar." In the first place, I am not disposed to agree with Mr. Darwin's materialistic view that flowers are beautiful solely to attract insects; for his opportunities of observation have evidently been incomplete, since a number of wind-fertilised flowers that have come under my own observation are coloured, are not closed, and are visited by insects. In any case colour is only a minor source of attraction to insects, as I hope to show later. Now for Mr. Gale's comment "Maize is one of these latter, and, therefore, produces no honey." That is, Mr. Gale asserts that the maize flowers are not coloured, are closed, are destitute of nectar, and are never visited by insects. Now, these assertions are wrong in every particular. In reds, browns and yellows, the male blooms on the tassel are quite gaily coloured and are often very beautiful. Next, the male blooms are not closed, but are quite open enough for the bees to get to the very bottom; then, as I shall show, they are not destitute of nectar, and, finally, they are regularly visited by bees and other insects. Now, as many of our best honey-producing flowers are inconspicuous, some other sense than sight must come into use. Probably the most highly-developed sense in the insect is the sense of smell; boiled cabbage always collects the blowflies, even when covered from sight, and the smell of honey always attracts the bee no matter how insignificant the flower in which it is contained. It is well-known fact that insects can hear sounds that the human ear is incapable of hearing; and there is no doubt that they can detect perfumes too faint or too distant for human beings to detect, and that they are guided to their honey-food by these perfumes. Now my experience is that all flowers with a perfume contain honey and are visited by insects. Also I find that every honey has a characteristic perfume, identical with that of the flower from which it comes, and derived from the essential perfume-oils secreted in the nectar. Now, when a man can smell the honey in a flower surely the bees can do so too, and can find it too even without the aid of bright colours. I find that the maize-blooms of the tassel have a very decided perfume never to be mistaken when once recognised. And I find that the honey brought in by bees working on maize always carries the perfume of the maize-blooms. And because I can smell the honey in the blooms, I have proved and know that maize can and does produce honey. In these matters it is much safer to trust to one's nose (if it is one that can smell) than the text books. And if Mr. Gale will follow his nose in the cornfields on a muggy summer's afternoon as the bees follow theirs, he will have no doubt as to whether corn produces honey.

Mr. Gale declares that "Corn-honey is a modern invention"; so is the bar-frame hive, the use of which alone enables us to identify the honey of various flowers with any degree of certainty. Referring to his personal experience on the Lower Clarence before the introduction of sugar culture there, when it was only second to the Hawkesbury as a corn-producing district, Mr. Gale says: "I, with others, kept a number of hives, and in no case did the faintest suspicion enter my mind that I was harvesting corn-honey, because I knew that the grasses yield nothing of the kind." An open confession truly—having his mind made up he did not take the trouble to find out. Furthermore, Mr. Gale settled in the Clarence in the year 1868, thirty-three years ago, and in those days and for long after the gin-case hive reigned supreme, men got their harvest all mixed together once or twice a year. Under those conditions how could men know much about corn or any other kind of honey? But now-a-days with the frame hive "robbed" once every ten days one has a chance of getting to know something about the matter. Mr. Gale is also troubled about the want of uniformity in the samples shown him as corn-honey. But this is easily explained, as the successive corn crops cover a long period in their bloom, and unless care is taken in separating it the bulk samples at different times will be affected by other stronger and darker honeys. In this district (Nepean and Hawkesbury), the apple, bloodwood, stringy-bark, grey-gum, and others all come in (in their years of bloom) during the period of corn-bloom. And the presence of a little honey from any of these will quite alter the sample. In order to get a reliable sample of corn-honey, advantage must be taken of the fact that the bees of one hive work on one bloom while it lasts. In my apiary, some hives stick to maize right through the period of bloom, and others work on apple, grey-gum, bloodwood, &c., as they come out. By taking the sample from these hives that keep to maize, or by taking it from hives during the occasional intervals when no other bloom but maize is out, a reliable sample can be obtained that never varies.

It has been a hobby with me to identify the honeys of various flowers in this district during the past eight years. And in this work I have identified those from maize, broom-millet (another grass) orange, stone fruit, clover, dandelion, water gum (*Laurina tristania*), Grass-tree (*Zanthorrhœa minor*), Red Apple (*Angophora lanceolata*) White Apple (*Angophora subvelutina*), the She Oak (another wind-fertilised flower), and from many eucalypts. Each honey is typical, has the same perfume as the flower (often very marked) and is the same from year to year. For eight years I have worked an apiary (now numbering 150 hives) in this essentially maize-growing district, spending all my time in the season among the bees and blooms. I have had the corn under the closest of observation during the whole time, nor do I think I can be classed as a careless or non-observant beekeeper " who is at sea " and needs to be put right in a matter so closely affecting his own business.

The following are some of the reasons for believing that bees gather large quantities of corn-honey:—

(1.) When the maize fields are in bloom, if no other honey-flow is on, the whole apiary makes for the corn tassels. At such times the bees roar and show signs of excitement over their work, such as they never show except when they are bringing in honey. Moreover, the bees show no signs of robbing each other when the hives are opened—a clear sign to every beekeeper that the bees are getting plenty of honey. If other honey-blooms are out a large proportion of the hives still keep to the maize and bring in the same type of honey.

(2.) The bloom of the tassel is not closed like the cob, but when the flower is secreting honey (especially in close, thundery weather) the bees eagerly work in to the bottom of the cup, fairly jostling each other to get at the sweet-smelling nectar therein.

(3.) During the period of maize-bloom, the bees working on maize bring in large quantities of dull greenish-coloured honey, mild and pleasant in flavour, candying speedily into soft white crystals, rather brittle in the grain. This honey is not so glutinous as most honey, cuts differently in uncapping, and when new, carries with it the odour of the maize-blooms.

(4.) I have not observed this honey except in maize districts, and never anywhere except when the maize is in bloom. In my own district this type of honey is plentiful. A sample I took to Sydney was at once recognised by an old Hunter River resident as "corn-honey," like that known and enjoyed on the Hunter in early life. I have noticed the same type of honey in the Tumut District in a sample gathered around the Tumut maize flats. This fact is significant, as the native honey-producing timbers in the Tumut District are quite different from those on the Hawkesbury.

(5.) During a visit to the Richmond Agricultural College apiary some years ago, Mr. McCue, the College apiarist, informed me that maize formed the main source of honey supply at the College, and his description of the characteristics of maize-honey coincided exactly with my own experience.

(6.) When this " maize-honey " is coming in at my apiary the bees of the colonies gathering it may be observed flying direct to the maize field on the plains, and not to the mountains where most other honey in the neighbourhood is obtained.

(7.) The bees gathering this maize-honey may be observed to have the maize-pollen on their legs. Moreover, when they return home from the maize fields with the maize-pollen they have the rings of their body extended to full length, showing plainly that their honey sacs are also full. And as bees do not visit more than one type of flower at a time, this fact affords a clear proof that the load of honey was gathered from the maize tassels as well as the load of pollen. If one of these bees be crushed a clear drop of honey will be seen exuding from its body, and this honey with that in the hive carries the odour of the maize-blooms. Surely such evidence is conclusive to all save those who go to the botanists instead of to Nature for their facts.

(8) The other great honey-producing flowers in this district have definite periods of bloom extending over from about three weeks to six weeks. Moreover, they do not bloom every year but at intervals of two and sometimes three years. But the honey I identify as corn-honey comes in during the whole period of maize-bloom extending over a period of some four or five months. It never comes in before the early maize-blooms and ends with the bloom of the late sown crops.

(9.) There is no other flower about this part that covers this period of maize-bloom, except possibly the lucerne, but in this district we seldom get lucerne-honey in appreciable quantities because the farmers cut the crops for hay as soon as the flower buds begin to burst. Moreover, when bees bring in lucerne-honey they also bring in lucerne-pollen; this is of a dull dirty greenish colour like clover-pollen and not in the least like maize-pollen.

(10.) During the past season my bees brought me in between 3 and 4 tons of corn-honey. Personally, like Mr. Gale's friend, I prefer it to any other. And an extended experience in the matter has convinced me that the maize-plant is one of the most reliable and abundant producers of honey that we have, while the quality is such that it is relished wherever it is known.

In view of all these facts, and in view of the amount of choice corn-honey that filled my shelves, Mr. Gale must show me some better reason than the *ipse dixit* of the botanist, before I can consent to disbelieve the evidence of all my senses.

MISCELLANEOUS.

Forestry.

ALLEGED FELLING OF IMMATURE TREES BY THE FOREST DEPARTMENT.

The Engineer-in-Chief of the Railway Department in a Parliamentary Report published in the *Journal* of 18th July, 1901, on the King William's Town Sleeper Factory (G. 24—1901), said:—

> "I am informed that from 15,000 to 20,000 healthy young trees are felled annually averaging from 9 inches to 18 inches in diameter at the butt. It wants no forethought to grasp the far-reaching effects this will have on the future supply of timber for the manufacture of sleepers."

This statement was duly questioned by the Conservator of Forests, who drew the attention of the Under Secretary for Agriculture to it and requested that detailed reports be obtained from the Engineer-in-Chief and the Conservator of Forests, King William's Town.

In reply to the Under Secretary's letter of inquiry to the latter gentleman he denied that there was any truth in the Engineer-in-Chief's statement and added the following information, viz:—

> "During the year 1899 the total number of yellow-wood trees marked and sold, in this Conservancy, only amounted to 6,427, of which 2,556 were classed and disposed of as poles, being under twelve inches in diameter. Again, during the year 1900, the total number of yellow-wood trees marked and sold, in this Conservancy, amounted to 4,663, of which 1,590 were classed and disposed of as poles, being under 12 inches in diameter.
>
> I may point out that, in marking sections for felling, a certain number of poles must inevitably be included. These are only marked when damaged, or when it is necessary that they should be thinned in order to enable other healthy trees to develop.
>
> The Engineer-in-Chief may rest assured that this Department is taking every precaution to safeguard the interests of the Forests, and I shall be glad if he will cause the mis-statement to be contradicted."

The Engineer-in-Chief's next step was the publication of an alteration (Erratum.—G. 24—1901) of the erroneous Report, viz:—

> Substitute 'from 1,500 to 2,000 healthy young trees' for '15,000 to 20,000 healthy young trees.'"

This Erratum was by request also duly published in the *Journal*.

On receipt of the Erratum the Conservator of Forests, King William's Town, immediately advised the Under Secretary for

Agriculture that the Erratum itself was wrong inasmuch as instead of "from 1,500 to 2,000 healthy young trees" it should have read "from 1,500 to 2,000 damaged or crowded young trees."

The matter was referred to the General Manager of Railways, and on 9th December last he wrote to the Under Secretary for Agriculture returning the papers and stating from enquiries he had made it was clear that on one side or the other there was a misconception, and under the circumstances he would suggest that the matter be allowed to drop.

As the misconception referred to by the General Manager of Railways reflected seriously on the Eastern Conservancy of Forests, and clearly did not arise there, there are no circumstances precluding the Forest Department from the right to publication of the above evidence of the erroneous nature of the Report and Erratum and the complete exoneration of the Forest Department from a charge which appears to have had no foundation.

Paspalum Dilatatum.

Small quantities of seed of the American fodder-grass *Paspalum dilatatum* have been sown by several persons in this Colony, but we have not yet heard of the result of their efforts to propagate the grass. From the success attending its cultivation in other parts of the world we are very hopeful about it.

According to the *Natal Agricultural Journal* a small quantity of the seed was sown by a correspondent about the 1st December in fairly good soil, and was watered regularly by means of a hose. Germination, as usual, proved slow, and many of the seeds proved sterile. About six weeks after sowing a few plants came through, and are now about two inches in height, so it will be seen that their growth has been by no means rapid. The common land grasses proved troublesome, and threatened to smother the *Paspalum dilatatum*. Probably the only means by which the latter grass can be saved is by transplanting it into clean land. The correspondent intends sowing the rest of the seed next January, as he thinks it likely to succeed best when sown at that time.

Sardinian Cows.

The *Bulletin Agricole* of Algeria of the 15th Eebruary, 1901, advocates the introduction of the Sardinian cow into Algeria. This animal is described as very hardy, living in a half wild state on the mountains where the pasture is poor and where the climate, as regards heat and cold, is quite as severe as is met with in Algeria.

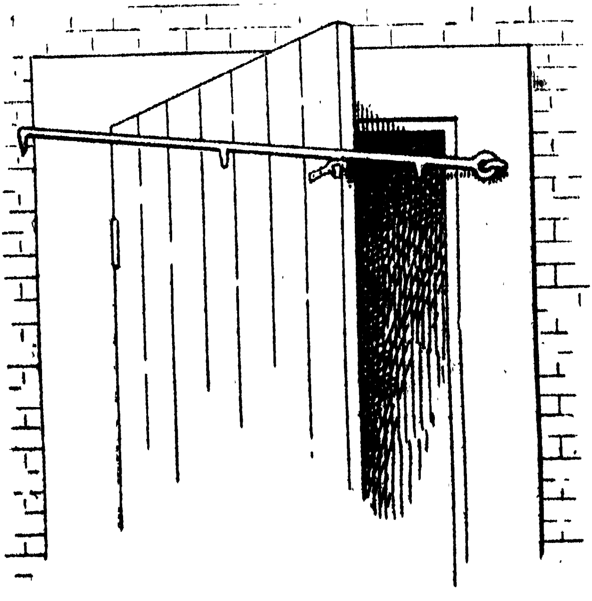
A Sun Motor.

In the Algerian *Bulletin Agricole* of the 15th May, 1891, is described a sun motor which is in successful use at Los Angeles in California. It is the result of a series of costly experiments which have been in hand for some years past under some Boston capitalists. This machine develops a ten horse power. It is hoped that certain improvements will bring it up to 15 horse power. It works a pump which yields 62·20 hectolitres of water per minute. The heating power of the reflectors is shown by the fact that copper placed in the focus of the apparatus melts in a few seconds, and a bit of hard wood lights like a match. The great reflector has a diameter of 10.55 metres, the whole surface being covered with 1,800 glass discs. The apparatus is automatic, and follows the movements of the sun when once started. It is hoped to utilise this machine in pumping water for the American railways in the deserts where fuel is as scarce as water. In 1889 I saw a similar machine at work at the Paris Exhibition.

D. E. HUTCHINS.

Controlling Doors of Farm Buildings.

The following sketch from the *American Agriculturist* shows how a door may be conveniently kept ajar as widely as required for ventilation or otherwise.



A blacksmith can fashion the iron work in half-an-hour and we are sure it will be money well spent. The rod can be attached either to the inside or outside of the doorway. The use of ⅝in. round iron is recommended and the staples should be attached to door and post sufficiently high to allow a person to walk under the rod when it is in use.

Blinkers.

A contemporary reports that the London papers have recently contained letters from Colonel Josiah Harris recommending the abandonment of blinkers on horses, and that he says:—As proof of my opinion, not one of the thousands of army horses has blinkers, and I have reports from the Great Northern, London and North Western, Great Central, Great Western, London, Brighton and South Coast, Great Eastern, and Midland Railway Companies, who have now upwards of 13,000 horses working without blinkers; the North London Tramways 7,000, and Carriers and others 10,000—upwards of 30,000.

Value of Soil Analyses.

Many farmers hold erroneous ideas as to the value of soil analyses. We hear farmers speaking as though they only required to have the soil analysed to know what manures to apply to certain crops to obtain the best returns. This, however, is far from being so. In the first case, as every farmer knows, it would be nearly impossible to obtain a sample that would fairly represent even a ten-acre field. Besides this, an analysis will only show what the soil contains; it will not tell the farmer whether the plant food is in such a condition that the plants can make use of it, neither will it tell him what treatment the soil requires to make that plant food available. So many other things, such as the physical condition of the soil and subsoil, its ability to retain moisture or perhaps the reverse, have to be taken into consideration that (except to the scientist) a soil analysis is just as likely as not to prove misleading in dealing with the manures such a soil requires. The only guide to the farmer is experience. Find out what others have done under similar conditions, and prove by experiment whether the treatment beneficial in their case is equally so in yours.—*Melbourne Weekly Times.*

GOVERNMENT NOTICES.

Game Seasons, 1902.

In view of the near approach of the Shooting Season, the following schedules showing the General and Special Close Seasons for Game the respective Districts of the Colony at the present date are published for the information and guidance of all concerned.

Agricultural Department, Cape Town, 7th January, 1902.

GENERAL CLOSE OR FENCE SEASON.

Close or Fence Season.	Division.			
I. FROM 16TH JUNE to 31ST JANUARY	Bredasdorp Caledon Cape Clanwilliam Ladismith	Malmesbury Mossel Bay Namaqualand Oudtshoorn Paarl	Piquetberg Riversdale Robertson Stellenbosch Swellendam	Tulbagh Van Rhynsdorp Worcester .. ..
II. FROM 1ST AUGUST to LAST DAY OF FEBRUARY	Aberdeen Albert Beaufort West Britstown Calvinia Carnarvon Ceres	Colesberg Fraserburg George Graaff-Reinet Hanover Hope Town Humansdorp	Jansenville Kenhardt Knysna Middelburg Murraysburg Philipstown Prieska	Prince Albert Richmond Steynsburg Sutherland Uniondale Victoria West Willowmore
III. FROM 1ST SEPTEMBER to LAST DAY OF FEBRUARY	Albany Alexandria Aliwal North Barkly East Bathurst Bedford	Cathcart Cradock East London Fort Beaufort Glen Grey Herschel	King William's Town Komgha Peddie Port Elizabeth Queenstown Somerset East	Stockenstrom Stutterheim Tarka Uitenhage Victoria East Wodehouse
IV. FROM 16TH AUGUST to 31ST MARCH	Barkly West Hay	Herbert Kimberley	Gordonia Mafeking	Vryburg
V. FROM 1ST SEPTEMBER to 15TH APRIL	Griqualand East, Territory of	Transkei, including Gcalekaland	Tembuland, including Emigrant Tembuland and Bomvanaland	Port St. John's

SPECIAL CLOSE SEASONS.

NOTE.—In certain Divisions it has been found desirable to have a Special Close Season for various animals and birds, and to include certain birds under the provisions of the Game Acts.

Description of Game.	Division.	Special Close Season.
Grysbok	Cape—Constantia Area	1st December to 30th June
	Swellendam	1st January to 30th June
Gemsbok	Namaqualand	1st December to 31st May
Rhebok *Steenbok* *Duiker* *Hares*	Prieska	1st August to 31st January
Springbuck	Herbert	1st September to 31st January
	Philipstown	1st December to 31st January
Dikkop	Humansdorp	1st August to 31st January
	Port Elizabeth and Uitenhage	1st September to End of February
Guinea Fowl	Aberdeen	1st October to 31st March
	Graaff-Reinet	1st October to 31st January
Namaqua Partridge or Sand Grouse	Carnarvon	1st December to 31st May
	Fraserburg	1st February to 31st July
	Namaqualand	1st May to 31st October
Partridge	Albany	1st August to End of February
	Cathcart	1st August to 31st March
	Elliot (Tembuland)	1st September to End of February
	Humansdorp	1st July to 31st January
	Port Elizabeth	1st July to End of February
	Uitenhage	1st July to 30th April
aauw	Calvinia, Ceres, Clanwilliam, Malmesbury, Piquetberg, Queenstown, Van Rhynsdorp, Worcester	1st December to 30th June
	Carnarvon, Namaqualand	1st December to 31st May
	Fraserburg	1st February to 31st July
	George, Humansdorp	1st August to 31st January
	Port Elizabeth	1st September to End of February
Pheasant *Quail* *Knorhaan*	Albany	1st August to End of February
	Cape	16th June to 31st January
	Uitenhage	1st September to End of February
Wild Duck	Caledon	1st December to 31st January
	George	1st August to End of February
	Gordonia	16th August to 31st March
	Port Elizabeth and Uitenhage	1st September to 31st December
	Elliot (Tembuland)	1st September to 15th April
Wild Goose	Caledon	1st December to 31st January
	George	1st August to End of February
	Gordonia	16th August to 31st March
	Elliot (Tembuland)	1st September to 15th April
Coot	Caledon	1st December to 31st January
	George	1st August to End of February
Snipe	Elliot (Tembuland)	1st September to 15th April

SPECIAL CLOSE SEASONS—*Continued.*

Description of Game.	Division.	Special Close Season.
Wild Ostriches	Beaufort West, Calvinia ..	1st June to the 360th day after
	Barkly West, Hay, Herbert, Hope Town, Kimberley	1st June to 30th May
	Namaqualand ..	1st June to 31st January
	Kenhardt ..	1st April to 31st October
	Vryburg ..	1st September to End of February
	Britstown, Carnarvon ..	1st August to End of February; but these birds are now specially protected in Britstown Division up to 17th November, 1902, and in Carnarvon Division up to End of February, 1902.

NOTE.—To kill Wild Ostriches a Licence fee of £20 for the season must be taken out through the Resident Magistrate of the Division in which the birds are to be hunted. Further, an export duty of £100 is levied on each Ostrich (wild or tame) exported to other countries, and £5 on every Egg: except to any State or Country that imposes a duty of not less than these respective amounts.

"ROYAL" OR BIG GAME.

A Special Permit to shoot any of the varieties of Big Game mentioned hereunder must be obtained from the Government in addition to the Ordinary Game Licence. Application should be made to the Under Secretary for Agriculture through the Resident Magistrate of the Division in which the Game is to be hunted.

Description of Game.	Where found; and General or Special Close Season.
Elephant	Alexandria, Uitenhage, 1st September to End of February.
	George, Knysna, 1st August to End of February.
	NOTE.—As Elephants only exist in limited numbers in these Divisions, special permits are only granted in very exceptional cases. Landed proprietors, or persons authorized by them, are, however, entitled to kill Elephants on their own property.
Eland	Only a few domesticated Elands are to be found in the Colony—at Groot Schoor, Rondebosch, and in Graaff-Reinet Division. No permits are granted to shoot these animals.
Hippopotamus	Not to be found now in the Colony.
Zebra	Cradock, Somerset East, 1st September to End of February.
	George, Prince Albert, Uniondale, 1st August to do.
	Oudtshoorn, 16th June to 31st January.
	Only a few troops of Zebras exist in these Divisions, and their destruction is consequently prohibited.
Buffalo	Albany, specially protected up to and including 8th December, 1901.
	Alexandria, do. do. do. 26th July, 1904.
	Bathurst, do. do. do. 5th May, 1904.
	Uitenhage, Close Season, 1st September to End of February.

'ROYAL" OR BIG GAME—*Continued.*

Description of Game.	Where found; and General or Special Close Season.
Bontebok	Bredasdorp, Swellendam, 16th June to 31st January.
Blesbok	Prieska, Steynsburg, 1st August to End of February. Gordonia, 16th August to 31st March.
Gemsbok	Calvinia, Kenhardt, Prieska, 1st August to End of February. Barkly West, Gordonia, Mafeking, Vryburg, 16th August to 31st March.
Gnu or Wildebeest	Gordonia, Mafeking, Vryburg, 16th August to 31st March.
Hartebeest	Hope Town, Kenhardt, 1st August to End of February. Barkly West, Gordonia, Hay, Herbert, Kimberley, Mafeking, Vryburg 16th August to 31st March
Koodoo	Ladismith, Namaqualand, Riversdale, 16th June to 31st January Hope Town, Jansenville, Prieska, Prince Albert, Willowmore 1st August to End of February. Barkly West, Gordonia, Hay, Herbert, Mafeking, Vryburg 16th August to 31st March. Kimberley, 16th August to 31st March.
Rietbok	Komgha, specially protected up to and including 5th May, 1904. East Griqualand, specially protected up to and including 28th May, 1902, and General Close Season, 1st September to 15th April.

GAME SPECIALLY PROTECTED FOR CERTAIN PERIODS.

Description of Game.	Division in which it is protected, and for what period.		
All kinds of Game	Albany—Municipal Commonage	Up to and including	17 Nov., 1902
	Aliwal North—Do.	Do.	20 Aug., 1902
	Cradock— Do.	Do.	28 May, 1902
	East Griqualand—All Commonages ..	Do.	28 May, 1902
	Malmesbury—Field Cornetcies of Mossel Bank River and Paardenberg ..	Do.	8 Feb., 1904
	Mossel Bay—Municipal Commonage	Do.	31 Mar., 1902
	Paarl—(Paauw excepted)	Do.	26 Nov., 1902
	Port St. John's ..	Do.	25 June, 1902
	Somerset East Commonage	Do.	11 April, 1903
	Wodehouse—Dordrecht Commonage ..	Do.	23 Sep., 1903
	Tembuland—Cala Commonage	Do.	8 April, 1904
	Tembuland—Engcobo do.	Do.	15 Feb., 1904
	Tembuland—St. Mark's District	Do.	31 Aug., 1904
	Transkei—Butterworth Commonage, &c., and Ibeka Reserve ..	Do.	14 July, 1904
All kinds of Antelope	Barkly East ..	Do.	4 June, 1902
	Elliot (Tembuland) ..	Do.	18 July, 1902
Buffalo ..	Albany ..	Do.	8 Dec., 1904
	Alexandria ..	Do.	26 July, 1904
	Bathurst ..	Do.	5 May, 1904

GAME SPECIALLY PROTECTED FOR CERTAIN PERIODS—*Continued.*

Description of Game.	Division in which it is protected, and for what period.		
Bushbuck Ewes	Albany	Up to and including	28 Dec., 1903
	East London	Do.	12 Nov., 1902
	East Griqualand	Do.	28 May, 1902
	King William's Town	Do.	21 Jan., 1903
	Peddie	Do.	31 Mar., 1903
	Victoria East	Do.	2 Feb., 1903
Duiker	George	Do.	27 Sep., 190[illegible]
Grysbok	Uitenhage	Do.	2 Feb., 1903
Klipspringer	East Griqualand	Do.	28 May, 1902
Oribe	Albany	Do.	28 Dec., 1903
	Bathurst	Do.	22 Mar., 1904
	East Griqualand	Do.	28 May, 1902
	Port Elizabeth	Do.	27 Sep., 1902
Rhebok—Rooi- & Vaal-	Albany	Do.	28 Dec., 1903
	Aliwal North	Do.	20 Aug., 1902
	Caledon	Do.	1 Feb., 1902
	East Griqualand	Do.	27 Sep., 1902
	George	Do.	28 May, 1902
Rietbok	Komgha	Do.	5 May, 1904
Springbuck	Uniondale	Do.	21 Sep., 1903
Steenbook	Aliwal North	Do.	20 Aug., 1902
	Caledon	Do.	1 Feb., 1902
	Carnarvon	Do.	End of Feb., 1902
Ant-Bear or *Aard Vork*	Britstown	Do.	17 Nov., 1902
Dikkop	East London	Do.	14 July, 1904
Partridges	Albany—Salem Commonage	Do.	3 May, 1902
Paauw	East London	Do.	14 July, 1904
Pheasants	Albany—Salem Commonage	Do.	3 May, 1902
Plovers	East London	Do.	14 July, 1904
	Kimberley	Do.	18 Nov., 1903
Wild Ostriches	Britstown,	up to and including	17th November, 1902.
	Carnarvon,	Do.	End of February, 1902.
Secretary Bird	East London	Do.	14th July, 1904.
	Fraserburg,	Do.	14th October, 1904.
	Uitenhage,	Do.	26th August, 1904.
	Van Rhynsdorp,	Do.	27th September, 1902.
Great and Small Locust Birds	Over the whole Colony, including the Native Territories	up to and including	10th March, 1902.
Wattled Starling or Kaalkop Spreeuw	Over the whole Colony, excluding the Native Territories	up to and including	11th August, 1904.
Red-shouldered Glossy Starling or Green Spreeuw	King William's Town,	up to and including	27th October, 1904
Owls and Hawks	Fraserburg,	Do.	14th October, 1904.
Blaauw Valk	Van Rhynsdorp,	Do.	27th September, 1902.
Stanley or Blue Crane	Fraserburg,	Do.	14th October, 1904.
Hornbill or Toucan	Bathurst,	Do.	10th September, 1902.
Various Small Birds	Cape	Do.	26th July, 1904.
	East London	Do.	14th July, 1904.
	Mossel Bay, Municipal Commonage,	Do.	31st March, 1902.
	Uitenhage,	Do.	26th August, 1904.
Cranes, Fish Eagles, Ospreys, Curlews, Terns and other Birds on Kowie River	Bathurst,	Do.	19th July, 1903.

BIRDS AND OTHER ANIMALS EXEMPTED FROM THE OPERATION OF THE GAME ACTS.

Description.	Division in which exempt and up to what date.		
Duiker Antelope	Bathurst,	up to and including	27th January, 1904.
	Komgha,	do.	22nd November, 1904.
Hares	Bathurst,	do.	27th January, 1904.
	Ceres,	do.	22nd March, 1902.
	George,	do.	21st December, 1903.
	Oudtshoorn,	do.	31st January, 1904.
	Riversdale,	do.	22nd September, 1904.
	Robertson,	do.	17th November, 1902.
	Steynsburg,	do.	2nd October, 1902.
	Swellendam,	do.	31st December, 1904.
	Tarka,	do.	5th February, 1902.
Namaqua Partridge ..	Victoria West,	do.	22nd November, 1904.
Paauw ..	Paarl,	do.	22nd November, 1904.

FOREST RESERVES.

Permits are issued to a limited extent for Shooting in the Crown Forests; information as to conditions of Permit and Scale of Charges may be obtained on application to the Conservators at Cape Town, King William's Town and Knysna.

Farmers' Apprentices. Dairy Assistants, &c.

As inquiries are from time to time received from young men from abroad as to where they may serve apprenticeship or gain practical experience of farming in this Colony, before starting on their own account, the Secretary for Agriculture invites Farmers who are willing to receive young men of good character, for this purpose, to register their names with the Under Secretary for Agriculture, stating the class of farming they do, how many young men they are prepared to take, and for what period they would enter into an agreement.

It is not probable that these young men will be in a position to give more than their free services in return for the experience they will gain; that is, they will not be able to pay any fee; and they will look to receiving free board and lodging in return for their services.

It is to Farmers, therefore, who are willing to grant such young men free board and lodging in return for services rendered, that this application is especially addressed.

With reference to the above notice to Farmers, the Secretary for Agriculture now invites young men who are willing to engage themselves as Farmers' Apprentices in Cape Colony to register their names with the Under Secretary for Agriculture, Cape Town. The apprentice will gain experience in farming in South Africa, and have an opportunity for spying out the land before starting on his own farm. To the new comer from another country this is essential, for he has much to learn and unlearn.

Many applications for such Apprentices have been received from Farmers in the Colony. It will be noted that the Apprentice will neither receive wages, nor pay a fee. He will get free board and lodging in return for his services, and at the same time acquire the experience he is in need of.

Applications for employment have also been received from several Lady Dairy Experts and Dairy Assistants; and Dairy Farmers and others desiring to avail themselves of the services of such are invited to register their names with this Department, giving particulars as to situation and extent of operations, etc., and salary and other emoluments they are prepared to offer.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM BASUTOLAND.

By command of His Excellency the Governor, the following Proclamation No. 164, 1901, was published in the Government Gazette of October 29th, 1901:—

Whereas by Proclamation No. 100, bearing date the 4th day of June, 1901, I did, by reason of the existence of the disease amongst cattle known as Rinderpest in the Territory of Basutoland, prohibit the introduction of horned cattle from the said Territory into this Colony:

And whereas the said disease has spread to the portions of this Colony which adjoin the said Territory, thus rendering it unnecessary to longer maintain the prohibition imposed by the said Proclamation:

Now, therefore, under and by virtue of the powers and authorities in me vested, I do hereby proclaim, declare and make known that from and after the date hereof the prohibition upon the introduction of horned cattle from Basutoland into this Colony shall be removed: the said Proclamation No. 100 of 1901 being hereby repealed accordingly.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM ORANGE RIVER COLON AND THE TRANSVAAL.

By command of His Excellency the Governor, the following Proclamation No. 139 1901, was published in the Government Gazette of August 16th, 1901:—

Under and by virtue of the powers vested in me by the "Animal Diseases Act," No. 27 of 1893, and by the "Animals Diseases Rinderpest Amendment Act," No. 2 of 1897, I do hereby proclaim, declare and make known that it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced into any part of this Colony from the Orange River Colony and the Transvaal, save and except such cattle as may be required to be introduced by the Government for the purpose of supplying Bile or Serum for inoculation against Rinderpest:

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed

And I do hereby further declare that this Proclamation shall have effect from and after the date hereof; and shall continue in force until amended or repealed.

Proclamation No. 217, bearing date the 29th day of October, 1900, together with the regulations issued thereunder, is thereby repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined Regulation for checking the spread of the infection is republished.

REGULATION ISSUED UNDER PROCLAMATION No. 30, DATED 20TH JANUARY, 1899.

Whenever under the provisions of Sections 11 and 12 of Act No. 27 of 1893, any area is declared or proclaimed to be an area infected with Rinderpest, it shall not be lawful for any person, animal, animal produce, article or thing, who or which may, in the opinion of the Magistrate of the District in which such area is situated, be liable to convey infection of Rinderpest, to leave or to be removed therefrom.

Inoculation Against Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of the Colony, it is desirable to inform stock-owners of the intentions of the Government as to dealing with the outbreak should it unfortunately become general in the Colony, and to advise stock-owners as to the best course to follow.

The Government propose that, as a general rule, cattle-owners themselves should perform the inoculation. Glycerinated Bile will be used, though circumstances may arise where it will be preferable to use Serum.

Bile Stations will be established in suitable places as necessity arises in localities where farmers have agreed to contribute the required proportion, say 5 per cent., of their cattle for production of the bile. It must be clearly understood that unless farmers are prepared to thus contribute the necessary cattle, it will be impossible for them to have the benefit of a Bile Station.

Glycerinated Bile will be issued free to contributors in proportion to the number of cattle contributed to a Bile Station. To non-contributors a fair charge will be made for bile if any be available for issue.

Serum will be charged for at the rate of £1 per bottle of ten doses.

A limited supply of Glycerinated Bile to meet emergencies will, for a time, be available, free of charge, from the Bile Station which has been established under arrangements with the Imperial Military authorities near Aliwal North.

As occasion requires, Demonstrators will be sent to instruct farmers in the method of inoculation, free of charge. They will, as a rule, inoculate only enough cattle to show how it is to be done, leaving the owner to continue the work. The Government will supply syringes on application to the Resident Magistrate, or to the Demonstrators at the following charges :- 20 cc. capacity, 20s ; 10 cc. capacity, 15s. This payment may be recovered on return of the syringe to the Magistrate, in good order.

After the experience gained during the outbreak of 1896-1898, the Colonial Veterinary Surgeon wrote* as follows :—

"The method of inoculation which I would recommend in future sporadic outbreaks of the disease is briefly as follows :—

" *Infected Herds.*—These should be inoculated at once with either serum or glycerinated bile; every animal which indicates infection by a rise of temperature should receive a large dose of not less than 100 cc. of serum, or 30 cc. of glycerinated bile; the latter should, by preference, be injected into the jugular vein, so as to secure its immediate action. Then from eight to twelve days after, all the animals in the herd which give no indication of being infected with the disease, or fever temperature, should receive an injection of pure bile ; not less than 10 cc., and for large animals 20 cc. This will confer a lasting immunity sufficient for all practical purposes.

" *Clean Herds.*—When it is decided to inoculate a clean herd, which is in danger of becoming infected through its proximity to diseased cattle I would recommend that the animals composing the herd should be inoculated first with 20 cc. of glycerinated bile, and to follow this inoculation in from eight to twelve days with an injection of from 10 to 20 cc. of pure bile. This will confer a strong and lasting immunity on the animals in the herd, and will be free from risk arising from the inoculation or of introducing the [illegible]"

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* See *Agricultural Journal*, June 8, 1899, in which will be found a full consideration of the different methods of inoculation.

"*Use of Pure Bile.*—Pure fresh bile should not be used in an infected herd, if any of the other inoculating materials can be obtained, as it tends to intensify the character of the disease in those already infected, and its immunising effect is too slowly developed to protect the healthy cattle against infection, if they are left in contact with those already sick. If no other means are available, however, the temperatures of the whole of the cattle in the infected herd should be carefully taken by the clinical thermometer, and only those which register a normal temperature should be inoculated with pure bile, the others should be separated from the inoculated lot at once, and carefully tended. If glycerine can be obtained, the spare bile should be mixed with it in the proper proportions—one part of glycerine to two parts of bile. This mixture, after standing forty-eight hours, may be injected into the affected animals in large doses, not only with safety, but with marked benefit.

"*Preparing the Bile.*—The bile should be taken from an affected animal immediately after death, or from one which is killed in the last stage of collapse.

"Biles of all shades of colour—except those which are red from the presence of blood—may be used, so long as they are clear and free from a putrid smell. Thin light yellow biles should also be rejected.

"All the galls extracted at one time should be mixed together, after standing separately for twelve to eighteen hours, so as to render them uniform in strength and immunising properties. Pure bile should be used on the second day after being drawn, unless it is kept in an ice chest, when it may be kept sweet much longer. But if pure bile is used as a second inoculation only, as above directed, it is not desirable to keep it longer than twenty-four hours.

"Glycerinated bile is made by adding one part of glycerine to two parts of bile, stir the mixture well, then mix all the biles taken at one time, and allow them to stand for eight days. But if there is urgency, the glycerinated bile may be used forty-eight hours after it is mixed.

"I would strongly recommend that in every outbreak of the disease that occurs, every drop of suitable bile, obtained from the animals which die, should be mixed with glycerine in proper proportions, two parts of the bile to one of glycerine, so that it may be preserved and made available for the inoculation of infected herds, and also for the first inoculation of clean herds which may be considered in danger. Pure bile for the second inoculation of clean herds can always be obtained when the disease appears in any locality, which would be the only reason for inoculating clean herds in the immediate vicinity."

Taking the Bile.—To remove the bile the animal must be laid on its left side, the skin and flesh on the right side immediately behind the last rib being cut through; the ribs being raised, the gall bladder will become visible. The gall bladder should be then punctured with a small knife and the gall allowed to escape into a wide-mouthed bottle. If wide-mouthed bottles are not available then ordinary whisky bottles may be used with an *enamelled* funnel, which can be procured at any country store. Every precaution must be taken that the operation is performed in a thoroughly clean manner, the hands of the operator and all knives, &c., being thoroughly cleansed before use.

Inoculating.—After having secured the animal to be operated upon, the necessary dose of bile is injected under the skin of the dewlap by means of a Hypodermic Syringe, care being taken that the point of the needle is not inserted into the flesh, but between the skin and flesh.

Symptoms of Rinderpest.

The Outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined description of the symptoms of Rinderpest is hereby published:—

The early symptoms of Rinderpest are a rise of internal temperature to 106 or 107° Fahr.; the animal stands with its head hanging down, ears drawn back and coat staring; it refuses all food and occasionally shivers. A mucous discharge flows from the eyes and nostrils; the extremities are cold, and the breathing is laboured and frequently accompanied with moaning. The inner part of the upper lip and roof of the mouth and all visible mucous membranes are reddened, and covered with an eruption of minute pimples, and later with a branlike exudation. The bowels are occasionally constipated, but in most cases diarrhœa sets in, the evacuations being slimy and very frequently of a dirty yellow colour. The prostration of strength is great, the animal staggering when made to move. In milch cows the secretion of milk is rapidly diminished, and soon ceases altogether. The disease usually ends fatally in from six to ten days.

It is generally believed that the infection is produced through the respiratory organs; from there the contagion becomes generalised. The contagion exists in the secretions and excretions, urine, saliva, mucous secretions of the nose, mouth and eyes, in the sweat, expired air, blood, and in all the tissues. It may be conveyed directly by the diseased animals, or indirectly by the dung, the bedding, the earth, hides, wool, meat, clothing, wagons or vessels, by people, dogs, sheep and chickens, &c. Contagion takes place only through short distances. When the weather is dry this is reduced to its minimum (about 27 yards), and the progress of the disease may be stopped by a ditch separating the diseased from the healthy animals.

In order to detect the earliest symptoms of Rinderpest, owners of horned cattle are warned of the urgent necessity for keeping a constant and close watch upon their stock. Any suspicious cases should be immediately reported to the nearest Resident Magistrate, Field-cornet or Police Officer, and the sick animal kept separate till an inspection is made. Stock should be carefully examined daily by a responsible person, more particularly for any symptoms resembling those above described.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October, 1900:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned.

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal

North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B' hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz.:—

Number and general description of Cattle ....
....
....

Owner's name and address ....
....

In charge of....................................

Place to which Cattle are being sent..............................

(Signature)..

(Address)..

Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature.......................................
(Address)...

Date.....................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle } ....
....
....
Owner's name and address } ....
....
In charge of...
Place to which Cattle are being sent.......................................

(Inspector's signature).......................................
(Address)...

Date.....................

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be a follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	8	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	8

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Seed Wheat.

A small consignment of "Red Egyptian" Seed Wheat has been imported by the Government for experimental sowing with a view to ascertaining its suitability as a rust-resistant wheat as well as its milling qualities.

This wheat will be distributed in lots not exceeding 100 lb. to any one person, upon deposit of a sum at the rate of 10s. per 100 lb., and the amount so paid will be refunded to all those applicants who furnish a full report, upon a printed form which will be supplied to them, showing the result of the trial.

Applications should be addressed to the Under Secretary for Agriculture, Cape Town, and must be accompanied by a remittance (by P.O. Order, Postal Note, Bank Draft or Cash) for the amount of the deposit.

As the consignment is a small one, early application should be made.

Tobacco Seed.

A small consignment of the following varieties of Tobacco Seed, viz. :—White Burley, Havana, Yellow Oronoko, Virginia "One Sucker," Virginia Pryor, Blue Pryor, Connecticut Seed Leaf, and Maryland. have been obtained from America by the Agricultural Department. Sumatra, Long Leaf Gooch and St. Félix are shortly expected.

Applications, accompanied by the deposit of 5s., should be addressed to the Under Secretary for Agriculture, Cape Town ; and will be dealt with in order of receipt.

The seed will be distributed in lots not exceeding 3 oz. each of any three of the above-mentioned varieties upon deposit of the sum of 5s. by each applicant, which amount will be refunded by the Government to all applicants who furnish a report in due course, giving full particulars as to the mode of cultivation adopted and the results obtained.

Feeding Stuffs.

ENGLISH PRICES per ton of 2,240 lb.

		£	s.	d.		£	s.	d.
BRAN—								
London Broad		5	12	0	to	5	14	0
LINSEED CAKES—								
London made	ex mill	7	15	0		7	17	
American (in bags)	ex dock	7	5	0		7	7	
Russian (in mats)	,,	7	10	0		7	12	
Russian (in bags)	,,	7	15	0		7	17	
East India seed	ex wharf	7	12	6		7	15	
COTTONSEED CAKES—								
London made	ex mill	4	15	0		4	17	6
Egyptian (in bags)	ex dock	4	15	0		4	16	3
Decorticated		6	15	0		6	17	6
Meal..		6	10	0		6	12	6
RAPE CAKES—								
East Indian Seed	ex mill	4	5	0				
MAIZE—								
American germ meal	ex mill	6	5	0		6	7	6
English		6	2	6		6	5	0
RICE MEAL—								
Rangoon	ex wharf	5	5	0		5	7	6
LOCUST BEANS—								
Cyprus		5	6	0		5	12	0
,, ground ...		7	0	0		7	6	0

Mark Lane Express, Dec. 16th, 1901.

AMERICAN PRICES per ton of 2,000 lb.

	£	s.	d.		£	s.	d.
Bran	4	15	10	to	5	0	0
Linseed Cake	5	16	8	,,	6	0	10
Cottonseed meal	5	6	3		—		

New York Weekly Journal of Commerce, Dec. 2nd, 1901.

LONDON WOOL SALES.

Sales and Prices of Cape Wools.

Continued from page 66.

The sixth series for the year 1901 began on November 26th, and the following is from Messrs. Stables, Straker & Co's Wool Circular and Report.

The following abbreviations are used to designate the different conditions and clips of wool:—Grs. stands for grease wool; Flc., fleece-washed; Scd., scoured; com., combing wool; Cl., clothing; Lam., lambs'; Dam., damaged; Hgt., hogget; Blk., black; Sn.-wt., snow-white; Xbd., cross-bred; Lks., locks; Bel., bellies; Pcs, pieces. Slip, wool off skins.

Not having the necessary woodcuts we give the various bale marks, such marks are described in letterpress, thus Double triangle, crossed arrows, &c.

EAST LONDON. Dec. 2.

Galician, Saxon, Galeka.

Mark.	Description & Ship.	Bales.	s.	d.
SSW	...sup.sn-wt. ..	9	1	0½
SW	... ,, ,, ..	8	1	0
XL	Grs.ext.light ..	16	0	6½
	,, ,, ,, ..	12	0	6
	,, ,, ,, com.	1	0	5½

Briton, Galician.

Mark.	Description & Ship.	Bales.	s.	d.
MF	Grs.sup com...	64not sold		
	,, ,, ,, ..	8	0	5
	,, ,, ,, lam.	2	0	5
	,, ,, ,, ,, dam	1	0	8½
	,, ,, light ..	25not sold		
	,, ,, com.long	8not sold		
	,, ,, ,, ,,	81	0	5¼
	,, ,, ,, ,,	36not sold		
	,, ,, ,, ,,	9	0	5¾
	,, ,, ,, ,,	8not sold		
	,, ,, ,, ,,dam	8	0	4¾
TS	,, ,, ,, ..	21	0	5½
	,, ,, ,, ..	8	0	5

Raglan.

Mark.	Description & Ship.	Bales.	s.	d.
LG	Grs.sup.light ..	15not sold		
	,, ,, ,, ..	17	0	5¼
	,, ,, ,, ..	44	0	5
	,, ,, ,, ..	19	0	4¾
	,, ,, ,, ..	5	0	4½
	,, ,, blue ..	8	0	5¼
	,, ,, ,, ..	22	0	5
	,, ,, ,, ..	6	0	4¾
	,, ,, ,, ..	1	0	4½
	,, ,, ,, dam.	1	0	4¼
	,, ,, com. ..	10not sold		
JD	.. ,, ,, light ..	2not sold		

Galeka, Norham.

Mark.	Description & Ship.	Bales.	s.	d.
88 S S	sup.sn.-wt. ..	9not sold		
	,, ,, ..	8	0	11
	,, ,, ..	9	1	1¼
	,, ,, ..	9	1	0¾

CAPE. Dec. 3.

Norham Castle.

Mark.	Description & Ship.	Bales.	s.	d.
L&B/S	..Grs. ...	18	0	7
,, ,, S/JGS	,, ..	27	0	7¼
	,, ..	9	0	4¾

Mark.	Description & Ship.	Bales.	s.	d
L&B/S HL	...Grs.lks. ..	10	0	7¼
,, ,, PC	.. ,, ...	6	0	7½
,, ,, GL	.. ,, ..	4	0	7¾
,, ,, RE	... ,, ...	5	0	7½
,, ,, JK	.. ,, ..	8	0	7
,, ,, OO	.. ,, ..	4	0	7¾
,, ,, UJ	.. ,, ..	11	0	7½
,, ,, OM	,, ..	9	0	7
	,, blk. lks. mix.	1	0	2¾
,, ,, AB	,, ..	3	0	7
	,, lks. ..	6	0	3½
,, ,, CL	... ,, ..	8	0	6¾
,, ,, BW	... ,, ..	6	0	7¼
,, ,, BP	.. ,, ..	7	0	7¼
,, ,, VG	.. ,, ..	6	0	7¼
,, ,, MB	,, ..	21	0	7½
	,, lks. ...	2	0	3½
,, ,, GG	,, ..	27	0	6¾
	,, ,, ...	1	0	3¼
,, ,, JJ	.. ,, ..	6	0	6¾
,, ,, DJ	.. ,, ..	5	0	6¾
,, ,, OD	... ,, ..	6	0	6¼
,, ,, AA	,, ..	21	0	6¾
	,, C C ...	1	0	3
	,, lks. ..	2	0	3¼

Carisbrook, Saxon. Kinfauns, &c.

Mark.	Description & Ship.	Bales.	s.	d
L&B/S/LD	..Grs. ...	18	0	7¾
,, ,,	,, ..	6	0	7½
	,, lks. ..	2	0	8½
	,, blk. ..	1	0	5¾
,, ,, HO	.. ,, ..	11	0	7
,, ,, AI	,, ..	10	0	7¾
	,, lam. ..	1	0	6
,, ,, SC	.. ,, ..	6	0	6½
,, ,, AB	... ,, ..	12	0	7¾
,, ,, ET	.. ,, ..	8	0	7¼
,, ,, SJ	.. ,, ..	13	0	7½
,, ,, GR	,, ..	18	0	7½
	,, lks. ..	1	0	3¼
	,, mix. ...	1	0	5¾
AN/G	.. ,, ..	1	0	6½
,, L	.. ,, lam. ...	2	0	6¼
NMK/L	...wsh. ,, ...	4	0	7
MG	,, fine ...	14	0	5½
	,, coarse ..	7	0	2¼
P	Scd. ..	5not sold		
	,, ...	6	0	4
	,, ..	1	0	5
	,, C C ..	1not sold		
Paarl/WP&Co/w.	.Scd. ..	6	1	1½
S ,, ,,	... ,, ..	1	0	10½
Wolseley [V&C]	.. ,, ..	12	0	9½

Mark.	Description & Ship.	Bales.	s.	d.

ALGOA BAY.

Norman, Gaul.

Mark.	Description & Ship.	Bales.	s.	d.
WGA	Grs.sup.com. ..	20	0	5¾
	,, ,, ,, ..	21not sold		
	,, ,, ,, ..	4	0	5¼
	,, ,, ...	14	0	4¼
	,, ,, ..	24not sold		
	,, ,, ,, ..	16	0	5
BB	Scd.ext.sup.sn.-wt.	4	1	1
	,, ,, ...	4	1	0
	,, ,, ..	6	0	11½
	,, ,, ...	5	0	11
	,, sup.coarse white	9	0	10
	,, ..	2	0	7¼
	,, blk. ..	1	0	8
	,, grey ..	1	0	7¾
	,, ,, ..	2	0	8

CAPE. Dec. 5.

Carisbrook, Norman, Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
CJM [TE]	sup.sn.wt.ext.	22	1	4½
	, ,, ..	2	1	2
CJM PLC (New Clip)	Grs.com. ..	12	0	5½
	,, ,, ..	6	0	4½
	,, sup ..	3	0	4¾
	,, dam. ..	1	0	4
,, PIC ,,	,, com. ..	8	0	5¼
	,, sup. ..	6	0	5

Goorkha, Briton.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl/RK	sn.-wt.sup. ..	21not sold		
	,, ,, ..	1	0	11½
CJM/XB 1901	Grs.com. ..	4	0	5¾
Paarl CJM/AM	sn.-wt.sup. ..	7	1	2½
	,, ..	2	1	1
,, ,, HD	,, sup. ..	5	1	1¼
	,, ..	1	0	11½
CJM/DW	,, ..	2	1	1½

Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
Caledon CJM/FL 1901	Grs.sup.com. ..	15	0	7¼
	,, ,, ,, ..	5	0	7
Waverley Ms./W	ext.sup.sn.-wt.	15	1	4½
Paarl TW&Co.	sup,sn.-wt.ext.	5	1	5
	,, ,, ,,	16	1	4
	,, ,,	4	1	2
WaverleyMs TW&Co/F	,, ,,	2	1	2½
	sn.-wt. ..	2	1	2½
	,, ..	1	0	11
B/TW&Co.	,, ..	9	0	11½
S	,, ..	1	0	11½

Kinfauns, Scot, Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl TW&Co.	sup.sn. wt.ext.	3	1	5
	,, ,, ,,	6	1	4
	,, ,, ,,	7	1	3
	,, ,,	1	1	1
	,, ,,	1	1	0
	sn.-wt	2	0	11½
	sup.sn.wt.ext.	29	1	4
	,, ,, ,,	6	1	2
	,, ,,	2	1	1
	,, ,,	1	1	0
B ,,	sn.-wt.	2	0	11
	,, sup.	2	1	0
L ,,	,,	1	0	11
	Scd.	4	0	11¼
Waverley/TW/F	ext.sup.sn.-wt.	9	1	4½
C/TW&Co.	Scd.coarse	8	0	9
CC ,,	,, grey	9	0	8
TW&Co.	,,	1	0	5½
	,,	3	0	4
	,,	1	0	2¼

Saxon, Carisbrook, Braemar, &c.

Mark.	Description & Ship.	Bales.	s.	d.
TW/Caledon	Grs. lam.	11	0	5¼
Paarl B<M>W	sup. sn.-wt. ext.	52	1	5½
	,, ,,	2	1	3
	sn.-wt.	2	0	11½
	Scd. grey	1	1	4
,, TW&Co./VB	sup. sn.-wt. ext.	2	1	3½
	,, ,,	1	1	2½
,, TW&Co.	,, ,, ext.	11	1	4
	,, ,, ,,	6	1	3
	,, ,,	3	1	0
SRS 1901	Grs.sup.com.	19	0	7¼
	,, ,, ,,	6	0	7
JD/Caledon ,,	Flc.wh.sup.com.	22	0	9
	,, ,, lks. mix.	1	0	4¾
E	Grs.com.	6	0	5
SL/Paarl	sup.sn.-wt.	23	0	11½

ALGOA BAY.

Galician, Norham.

Mark.	Description & Ship.	Bales.	s.	d.
JTJ	Scd. blk.	28	not sold	
ROG	,, ,,	9	not sold	
AWM	Grs.sup.com.	23	0	6¾
	,, ,, ,,	6	0	6¼
	,, ,, ,,	9	0	7
GPB	,, ,, ,,	21	0	6
MRB	,, ,, ,,	26	0	5¼
	,, ,, ,, dam.	1	0	4¼
	,, ,,	1	0	4¼
MRBB	Grs.sup.com.	8	0	5¾
	,, ,, ,, dam.	2	0	5¾
	,, ,,	3	0	5¼
MRBA	,, ,, com.	8	0	5¼
MRBL	,, ,, lam.	5	0	5½
MRBS	,, ,,	3	0	5

Mark.	Description & Ship.	Bales.	s.	d.
GP	Grs.sup.com.	15	0	5¾
	,, ,,	1	0	5
GPA	,, ,, com.	16	0	5¾
GPC	,, ,, ,,	7	0	6¼
CPCL	,, ,, lam.	8	0	6
CW	,, ,, com.	31	0	6
	,, ,, ,, dam.	2	0	5½
CWA	,, ,, ,,	14	0	5¾
	,, ,, ,, dam.	1	0	5¼

EAST LONDON.

Galeka, Norman, Briton.

Mark.	Description & Ship.	Bales.	s.	d.
EL Crossed Swords	sup.sn.-wt.	8	not sold	
	,, ,,	42	1	1¼
	,, ,,	45	1	1
	,, ,,	40	1	0½
FWS Toise	,, ,,	10	1	1
	,, ,,	44	1	0½
	,, ,,	2	0	11½
	,, ,,	2	0	9½
S/FW	sn.-wt.sup.	6	1	0
,, ,, Toise	,, ,,	23	not sold	
,, ,, L&P	,,	4	0	11
GR in triangle	Grs sup.	17	0	6¼
,, AR in triangle	,, ,,	8	0	6
B in triangle	sup.sn.-wt.	42	1	1
	,, ,,	18	1	0½

Raglan, Galeka.

Mark.	Description & Ship.	Bales.	s.	d.
WR/Glen	Grs.sup.com.	11	0	7
	,, ,,	3	0	5½
HTT	,, com.	19	0	6¼
	,,	13	not sold	
	,, dam.	1	0	4
B in triangle	sup.sn.-wt.	17	1	0
SCH	Grs com.sup.	44	0	5½
	,, ,, ,,	9	0	5¼
	,, ,, ,, dam.	1	0	5¼
HJW	,, ,, ,,	22	0	7¼
	,, ,,	1	0	6
	,, lam.	3	0	6
AJF	Grs.sup.com.	61	0	7¼
	,, ,,	2	0	5¾
	,, lks.	4	0	3½
CB	,, com.sup.	7	0	5
FPW	,, ,,	11	0	5½

Guelph, Dunolly, Raglan, &c.

Mark.	Description & Ship.	Bales.	s.	d.
ACMcD	Grs.sup com.	9	0	6¾
	,, ,, ,,	14	0	6
	,, ,, ,, lam.	12	not sold	
	,, bel.	11	0	4¾
Zulu	sup.sn.-wt.	31	1	0½
	,, ,,	38	1	0
	,, ,,	2	0	11½

Mark.	Description & Ship.	Bales.	s.	d.
Toise	sup.sn.-wt.	21	1	0½
	„ „	39	1	0
	„ „	6	0	11¼
	„ „	2	0	11
◇B	„ „	1	1	0
	„ „	8	1	0½
	„ „	12	0	11½
	„ „	1not sold		
DEN	Grs.sup.com.	23not sold		
GUB	„ „	15	0	5¼
	„ „	12	0	5
	„ „	8	0	4¾
WEB	„ „	13	0	5¾
MER	„ „	8	0	5¾
	„ „	1	0	5
KRD	„ „	6	0	6
COF	„ „ com.	6	0	5¼
SAL	„ „	13	0	5
	„ „	17	0	4¾
„ LBS	„ „ lam.	7not sold		

Norman, Galeka, Raglan.

Mark.	Description & Ship.	Bales.	s.	d.
Bolo	Scd.sup.	71not sold		
	„ „	31	0	11½
J H Hing	Grs sup.light	42	0	5¼
Highland Home	„ „ com.	2	0	5½
MB/T	„ „ light	18	0	5
„ EL	„ „ „	8	0	3¾
	„	4	0	4¼
„ T/EL	„ sup.	1	0	5¼
„ SM	„ com.	17	0	5
	„ sup.light	12not sold		
„ IS	„ „ „	5	0	4½
„ ISI	„ „ „	17	0	5
„ U	„ com.	7	0	5¾
M/RP	„ sup.light	6	0	4¾
„ MP	„ „ „	13	0	5
„ JD	„ „ „	10	0	5
„ GS	„ „ „	4	0	5½
„ CS	„ „ „	5	0	6
„ JW	„ com.	2	0	4¾
„ WH	„ sup.light	12	0	5
„ EW	„ „ „	6	0	4¾
„ JDB	„ „ „	1	0	4½
„ CP	„ „ „	1	0	4¾
„ CE	„ „ „	1	0	5
LE/EL	„ com.	1	0	5
WJE/EL	„ sup.light	1	0	5¼
JADW/EL	„ „ „	2	0	6
RP/EL	„ com.	1	0	5¼
SN/T	„	1	0	4¾
Crossed Arrows	Scd.sup. SW	31	1	1½
	„ „ „	66	1	1
<*>	„ „ „	19	1	1½
Baza	„ „	41	1	0¼
RT/Baza	„ „	47	1	0
	„ „	47	0	11½
FWS „	„ „	11	1	0½
RT/Lunda	„ „	7	0	11¼
FWS (+)	„ „	3	1	0

Mark.	Description & Ship.	Bales.	s.	d.
Lunda	Scd.sup.	2	1	0
	„ „	1	0	11
P/RA	Grs.com.	11	0	5½
	„ sup.	10	0	5
HHM	„ com.	2	0	5¾
	„ sup.	2	0	4½
	„	1	0	3½
	„ C C	2	0	3¼
W. Ayton	com.	14	0	5½

CAPE. Dec. 6.

Saxon, Scot, Goorkha.

Mark.	Description & Ship.	Bales.	s.	d.
Paarl/MW	ext sup.sn.-wt.	60	1	5
	„ „ „	29not sold		
„ [C]	sn.-wt.ext.sup.	14	1	4
„ „ S	„	1	1	1
<L>	„ „ „	10not sold		
WCO	Scd.sup.grey	14	0	7¼
SR	Flc.wsh.lam.	5	0	7¾
	„ „ „	4	0	6¾
	„ „ „	4	0	6½

Galician, Raglan.

Mark.	Description & Ship.	Bales.	s.	d.
TUR	Grs.sup.	10	0	5¼
	„ „	29	0	5
	„ „	20not sold		
	„ „	27	0	4¾
	sup.	2	0	4¼
LC/B	Grs.sup com.	27	0	5½

Carlsbrook.

Mark.	Description & Ship.	Bales.	s.	d.
HW	Grs.sup.com.	11	0	6¼
JG	„ „ „	4	0	6
EW etc.	„ „ „	11	0	6
	„ „ „	21	0	6¼
	„ „ „	13	0	5¼
	„ „ „	1	0	4
	„ „ „	22	0	5½
	„ „	9	0	5½
	„ „ „	27	0	5¼
	„	26	0	5
	„	18	0	4¾
HFC	„ dam.	1	0	4¾
HS	„ „	1	0	4

Galician.

Mark.	Description & Ship.	Bales.	s.	d.
HEB	Grs.sup.fine	17	0	5¼
TYL	„ „ „	9	0	5¾
FW	sup.	12	0	7
KAN	„	15	0	6½
NUN	Scd.sup.crse.white	6	0	9
	„ „ „ „	13	0	8½
[VR]	„ „ „ „	7	0	6½

EAST LONDON.

Briton, Raglan, Guelph.

Mark.	Description & Ship.	Bales.	s.	d.
B.T.Price	Grs.sup com. ..	24	not sold	
	,, ,, ...	24	0	5¼
Casephton	,, ..	5	not sold	
	,, skt. ..	10	0	8¼
Various	.. ..	8	not sold	

CAPE.

Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
DMT/Caledon (New Clip)	Grs ext.sup.com.	9	0	7¼
	,, ,, ,, lks..	1	not sold	
T S Caledon (New Clip)	,, ,, ,, com.	11	0	7¼
	,, ,, ,, ,,	1	not sold	
	,, ,, ,, ,,	11	0	7
	,, ,, ,, ,,	15	0	6¾
	,, ,, ,, ,,	19	0	7¼
	,, ,, ,, ,,	7	0	6¾
	,, ,, ,, lks	8	0	3¾

Norham, Dunottar.

All New Clip.

Mark.	Description & Ship.	Bales.	s.	d.
F	...Grs com. ..	6	0	7
G	... ,, ,, ..	3	0	6¾
M	... ,, ,, ..	5	0	6¼
B	... ,, ,, ..	3	0	6¾
D	... ,, ,, ..	5	0	6¾
E	... ,, ,, ..	6	0	6¼
A	... ,, ,, ..	2	0	6¼
I	... ,, ,, ..	2	0	6½
H	... ,, ,, ..	2	0	6¼
J	... ,, ,, ..	2	0	6½
A	... ,, ,, ..	9	0	6
JE&N	... ,, ,, ..	1	0	6
Paarl ,,	sup. sn-wt. ..	2	1	0½
	,, ,, ..	1	0	10½
Various	... ..	8	sundry	

Carisbrook.

Mark.	Description & Ship.	Bales.	s.	d.
NW	...Grs. ..	10	not sold	
[C]	... ,, ..	18	not sold	

Dec. 7.

Dunottar.

Mark.	Description & Ship.	Bales.	s.	d.
◇H	Grs.ext.sup.com.	5	not sold	
	,, ,, ,, ,,	41	0	5½
	,, ,, ,, ..	49	not sold	
	,, ,, ,, ..	10	0	5

Carisbrook, Soot, Goorkha.

Mark.	Description & Ship.	Bales.	s.	d.
POP (New Clip)	Grs.sup.com. ..	38	not sold	
	,, ,, ,, ..	17	0	6¼
Paarl/LRT	...sn-wt.ext.sup. ..	14	not sold	
,, ,, &c. ...	,, ,, ,, ..	4	1	3¼
,, EW ...	,, ,, ,, ..	8	not sold	
,, A ...	,, ,, ,, dam	1	1	0½
,, EW &c	,, ,, ,, ..	10	not sold	
	,, ,, ,, ..	2	1	0
,, E	,, ..	1	1	0
	Coarse white ..	9	not sold	

ALGOA BAY.

Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
◇II W C	Scd.coarsewhite	10	0	9½
	,, ,, ,,	5	0	10¼
	,, ,, ,,	8	0	9½

EAST LONDON.

Carisbrook, Briton.

Mark.	Description & Ship.	Bales.	s.	d.
CFB	...Grs.sup.com ..	7	0	5¼
MF	,, ,, light ..	8	0	4¼
	,, ,, ,, ..	6	0	4¼
	,, ,, ,, ..	11	not sold	
	,, ,, com.long	4	not sold	
	,, ,, ,, ,,	8	0	5

Guelph, Dunolly, Raglan.

Mark.	Description & Ship.	Bales.	s.	d.
Crossed Arrows	Scd.sup. ..	47	1	1
	,, ,, ..	17	1	0½
Baza	,, ,, ..	31	not sold	
	,, ,, ..	24	1	0
FWS Baza	,, ,, ..	10	1	1
	,, ,, ..	18	1	0¾
	,, ,, ..	8	1	0
FWS	,, ,, S W ..	10	1	0
	,, ,, ,, ,, ..	1	not sold	
P/L&P	,, ,, ..	9	0	11
	,, ,, ..	9	0	10¼
◇•	Scd.sup. ...	22	1	1½
	,, blk. ..	7	not sold	
	,, grey	9	0	10¼
	,, coarse white	8	0	8
M	..Grs. ...	1	0	5¼

Hubbuck.

Mark.	Description & Ship.	Bales.	s.	d.
GBA	..Grs sup. blue ..	19	[illegible]	5
DOH	,, ,, com. ..	87	0	5¼
	,, ,, ,, ...	74	not sold	
NSW	,, ,, ..	87	0	4¼
	,, ,, ..	41	0	5

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, 11th January, 1902, as telegraphed by the Civil Commissioners of the places respectively named, is published hereunder.

CENTRE.	A Wheat per 100 lb.	B. Wheat Flour. per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal per 100 lb.	F. Barley. per 100 lb.	G. Oats. per 100 lb.	H. Oat-hay. per 100 lb.	J. Potatoes per bag.	K. Tobacco (Boer Roll.) per lb.	L. Beef. per lb.	M Mutton per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q. Sheep. Slaughter.)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s d	£ s. d.
Aliwal North ...	0 10 6	0 17 6	0 13 6	0 10 0	0 11 6	0 12 0	0 12 0	0 9 0	1 0 0	0 1 0	0 0 10	0 0 10	0 2 6	0 3 0	£16 to £20	20/- to 22/-
Beaufort West ..	...	...	...	...	...	...	...	...	..	...	...	...	...	...	..	...
Burghersdorp ...	0 8 6	...	..	...	...	0 8 6	...	0 7 0	0 8 6	0 1 9	0 0 7½	0 0 7½	0 1 6	0 2 0	...	...
Cape Town ..	0 10 0	0 12 6	0 11 0	0 8 3	0 10 0	0 9 0	0 11 0	0 9 6	0 10 0	...	0 0 7½	0 0 8½	0 2 0	0 2 3	17 0 0	1 4 0
Clanwilliam ..	0 13 0	1 0 0	0 16 6	0 10 0	0 8 6	...	...	...	1 0 0	0 4 0	0 0 6	0 0 6	0 2 0	0 1 6	10 0 0	0 18 0
Colesberg ...	0 9 6	...	0 10 0	...	...	0 10 0	...	0 8 6	1 0 0	...	0 0 6	0 0 7	0 1 9	0 1 10	...	...
Cradock ..	...	..	...	...	...	...	...	...	...	...	...	...	..	...	...	...
Dordrecht ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
East London ...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	..	...
Graaff-Reinet ...	0 12 6	0 18 0	0 14 0	0 11 6	...	0 15 0	0 14 0	0 7 6	0 10 0	0 1 0	0 0 7	0 0 7	0 1 9	0 2 0	£12 to £15	20/- to 25/-
Graham's Town ...	...	...	..	0 10 6	...	0 8 0	—	0 7 0	0 8 6	0 1 0	0 0 9½	0 0 9	0 2 6	0 2 6	...	...
Kimberley ...	0 13 6	0 17 0	0 15 0	0 12 0	0 12 6	0 12 6	0 15 6	0 15 0	1 0 0	0 1 0	0 1 0	0 0 10	0 2 0	0 2 3	£15 to £18	20/- to 24/-
King Wm's Town	0 12 0	0 17 0	1 3 6	0 9 6	0 10 0	0 13 6	0 14 0	...	0 12 0	0 1 1	0 0 10	0 0 10	0 2 0	0 2 3	£16 to £18	19/- to 22/-
Malmesbury ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

CURRENT RATES OF AGRICULTURAL PRODUCE—(*continued*).

CENTRE.	A. Wheat. per 100 lb.	B. Wheat Flour. per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal. per 100 lb.	F. Barley. per 100 lb	G. Oats. per 100 lb.	H. Oat-hay. per 100 lb.	J Potatoes. per bag	K. Tobacco (Boer Roll) per lb.	L. Beef. per lb.	M. Mutton per lb.	N. Fresh Butter. per lb.	O Eggs. per doz.	P Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d	£ s. d	£ s. d.	£ s. d.	£ s. d.	£ s. d	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d
Mossel Bay ...	0 12 0	0 14 6	0 12 0	0 9 0	...	0 6 0	0 16 0	0 7 6	0 16 0	0 1 0	0 0 9	0 0 9	0 2 0	0 1 6	...	...
Pietermaritzburg, Natal	..	...	...	...	..	...	..	...	...	...	...	..	...	...	...	...
Port Alfred	...	...	...	0 14 7	...	...	0 7 0	...	...	...	...	0 0 9	0 2 3	0 2 0	...	.
Port Elizabeth ...	0 10 0	...	...	0 11 0	...	0 2 6	...	0 6 6	0 13 6	...	...	...	0 2 0	0 3 0	.	..
Queen's Town ..	0 11 3	0 17 0	0 11 0	0 8 0	0 6 0	0 15 4	0 15 0	0 6 0	0 12 0	0 2 6	0 0 8	0 0 8	0 1 6	0 2 4	...	..
Tarkastad ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Vryburg ...	0 16 0	1 1 0	0 17 6	0 15 0	0 16 0	...	0 13 0	1 1 0	1 10 0	0 1 3	0 1 0	0 1	0 3 6	0 4 3	16 0 0	1 5 0
Worcester ..	0 13 0	0 18 6	0 12 0	0 11 6	0 12 3	0 8 0	0 12 0	0 5 0	0 10 0	0 1 3	0 0 7	0 0 7	0 1 6	0 1 6	12 0 0	1 3 0

NOTE.—Returns have not been received from the Civil Commissioners of Beaufort West, Cradock, Dordrecht, East London, Malmesbury and Tarkastad.

THE

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EDITORIAL NOTES.

Quite a sensation has been caused in rural, official and commercial circles by the arrival of Mr. Willcocks' Report dated Johannesburg, 6th November last, upon Irrigation in South Africa. The sensation is pleasant, because without bias but purely from the unemotional point of view of the practical engineer, Mr. Willcocks writes favourably from start to finish, and because, so far as Cape Colony is concerned, we know his foundations are sure. Nothing short of prescience could have led an entire stranger going about his business in the ordinary way, no matter how naturally sagacious he might be, instantly to the very localities out of the many in our Colony that were most suitable for his purpose. There was nothing supernatural, however, in the matter, for the astute visitor wisely availed himself of the ever ready help of the Public Works and other Departments and got the right men to accompany him and meet him wherever he went. So by the additional aid of the locomotive, the Cape cart and indulgent military authorities, he got about from place to place in very quick time. The Report, avoiding everything extraneous, keeps closely to the salient points of the subject. It is so important to the community that we shall publish the Report serially till completed. The first portion appears in this issue.

In an age in which so much has been achieved in the eradication of the pests and nuisances that ravage South Africa, many of our farmers still appear to be waiting for the man who shall show them how to sweep the Prickly Pear from the face of the earth. And yet we thought we were on the right track when the arsenic and soda spray was introduced years ago. As long since as 1891 Mr. A. C. MacDonald of the Agricultural Department showed by the arsenical scrub exterminator that the enemy was to be destroyed cheaply and completely, and his advice was eagerly followed by many of our progressive farmers for a time, but we have since heard little of the matter. Experiments in the same direction have recently been made by the Queensland Department of Agriculture (recorded in this issue of the *Journal* at p. 184) which show the thoroughness of this destructive agent. Besides the Queensland results what better evidence can be adduced of the effectiveness of this remedy than the fact that soon after its introduction into Cape Colony large agricultural areas were put under the plough and were carrying crops that had for fifty years been impregnable thickets of prickly pear? It is probably the best method yet discovered, and no farmer need be beset by the nuisance who possesses the necessary appliances and the determination to conquer.

We anticipate an unqualified success for the Agricultural Show on the 20th and 21st of February. The prize list is an attractive one and includes champion gold medals from Mr. Rhodes for the most perfect Stallion, Bull, and African-bred Bull, and cash prizes from Mr. Struben for heavy and light class cattle, and the usual prizes and awards for every other kind of exhibit that finds a place in an Agricultural Show. It is over two years since rural fashionable Rosebank had the exhilarating excitement of a Show, and it is more than likely that the opportunity to hob-nob together once more upon cultural matters will prove an irresistible attraction to the farmers. Let us hope so, for the greater the success of this Show the greater the good that will ensue.

When strolling over the Kloof recently we noticed hosts of small birds hard at work among the weeds and coarse grasses in a friend's grounds, and in other directions "out back" we have often noticed the little birds, and some big ones, keeping up their pecker on seeds that the farmer will never miss. The gun and the trap often kill birds that deserve protection for their services as insect and weed destroyers, and probably the time will come when it will be conclusively proved that a much larger number of birds may be included in the provisions of Preservation Acts. While most people condemn most birds for making havoc among the crops and orchards, it is not generally known that our native birds are ever actively at work destroying innumerable seeds of the most troublesome weeds in garden and field. And not only the native birds but imported members of the feathered creation, whether cleaving the air and nesting on high or scratching for a living on *terra firma*, are also devotedly fond of the tiny seeds of nearly every plant that bides beneath the stigma of a weed. So that when we are casting up accounts against the birds something weighty has to go into the scale on account of weed destruction in addition to the substantial set-off he is entitled to in relation to his penchant for troublesome insects. Where weeds run riot in cultivated country it will be found that birds are proportionately scarce. A large part of their subsistence is derived from the seeds of the rank grasses that often crowd out better grasses in fields and lawns. When you see the birds busy on the lawn, they are pecking the seeds; when you see your fowls roaming among the herbage and in the pasturage they are filling their crops with the seeds of the weed. It is not improbable that the native birds prefer a good feed of insects and wild seed to the high food of the cultivator, for long before man planted his gardens in their domain they knew no other food. And then comes the other side of the account; and when one considers the destruction wrought by birds among fruit and newly-sown grain we feel inclined to add our loud acclaim to the bang of the gun and even cheerfully bait a trap. Still, what a terrific havoc the insects and weeds would create if there were no birds!

Apropos of the Export Returns published to-day we notice by extracts from the article on British Trade with South Africa quoted from the *British and South African Export Gazette* at p. 197, that, as [illegible]rmised in our resumé, several articles of export have begun to move upward. The demand for mohair is evidently increasing, for there is a good rise in market quotations as recorded by recent cables, and probably Dame Fashion is again asserting her preference for the Angora production. Natal has agreed to prohibit the exportation of the Angora ram, and so has Cape Colony, but neither can act till Mozambique also agrees, and we still wait for Mozambique. Meanwhile Angora goats are becoming numerous in other countries. We shall have some information upon this topic in the next issue of the *Journal*.

QUERIES AND REPLIES.

What can you recommend to kill maggots and prevent bluebottle flies from blowing sheep? The carbolic or tar dips are almost useless, for although they may kill the maggots they do not prevent the flies from visiting and "blowing" the sheep again almost immediately after the dip has been applied. What is needed is something that will not only kill the maggots but keep the flies off for some time as well, which would give time for old sores caused by the maggots to heal.

GEORGE BLAINE.

Our correspondent having used the usual maggot-killing mixtures now wants something that will so disgust the flies that they will abhor the sheep and avoid him in future or at any rate till his wounds are healed It is not often the Agricultural Department is stuck for a remedy, but this time Mr. Blaine has delivered a poser. The best thing we can do is to ask any of our readers who may have done so to let Mr. Blaine or ourselves know how they manage to keep the enemy at bay in the way he describes.—EDITOR.

Can you inform me what causes blindness in sheep in wet seasons just after they are shorn? At present I am running my sheep in three adjoining paddocks. There are a lot of cases of blindness in the middle paddock but none in either of the other two. The same thing happened after shearing last February, though at that time the sheep now running in No. 3 paddock were in No. 2.

G. WRIGHT.

The correspondent does not state how often he shears his sheep in the year. Twice-shorn sheep are more prone to catarrhal disorders arising from colds than those that are shorn but once a year. Neither does he say whether they ultimately recover from their blindness. We suppose they do or he would mention such a serious affliction. The probability is that blindness in sheep, which may often only be partial, is sometimes caused by exposure in cold and wet weather after shearing. It is, however, a somewhat common complaint and often arises from an obscure cause. The inflammation is similar to that seen in cattle but less severe, the majority recovering their sight under proper treatment. There is strong evidence that inflammation of the eyes in sheep is contagious. As a matter of precaution all affected sheep should be picked out from the flock and placed in some cool (if in hot weather) shady place and either of the following eye lotions administered, viz.: (*a*) Nitrate of silver 5 grains, distilled water 1 oz., to be dropped between the lids at least twice a day; (*b*) powdered sulphate of copper a teaspoonful, water 1 quart bottleful, applied as above; (*c*) sulphate of zinc a teaspoonful, water one quart bottleful, application similar. If the sheep are placed under cover, bathing the eyes with warm water and dressing them with olive oil is often all that is necessary. The nitrate of silver is, however, an excellent remedy in this form of what is called blindness in sheep, when the eyeballs become clouded.—EDITOR.

Can any of our readers inform us who breeds thoroughbred Rabbits in Cape Colony, especially the Belgian Hares or Lapin Géant des Flandres?—EDITOR.

Will you please inform me how to procure or produce the Kei-Apple Tree—*i.e.*, from cuttings or planting the apple itself? If the latter, must I plant the whole apple or take out the pips and plant them? At what depth should either be planted, and in view of very dry conditions prevailing is it wise to water these seeds before they sprout and push through the surface? Enclosed please find 6 stamps for medium. *Journal* preferred.

W. H. OLIVER.

There is no better plant for a permanent hedge than the Kei-apple (*Aberia caffra* Sond.), but you have to be patient while it is getting up and keep cutting it back atop so as to make it throw out plenty of branches low down the stem. If you are too merciful with the shears, you get at last a fine-looking hedge above, but the bottom is open enough to let your neighbour's kids and chickens through easily. Collect the fruit when dead ripe and rub it to pulp with water, using an enamelled bucket or a wooden tub, and wash away as much of the skins and refuse as you can. Then spread out the seeds on a bit of canvas and dry them quickly in a draught, not in the sun. They are very short-lifed, and you will often find the embryo quite green and beginning to grow even while in the pulp of the fruit that has fallen. Hence it is best to sow them very soon after saving. Use nursery boxes cut out of paraffine tins to receive the young plants when grown to three stem-joints; about thirty will do in one box. If you cannot give them much attention, you had better set the boxes half way into the ground in some rather shady place to keep the earth-mass in each from a casual drying-out, which would decimate the young stock. In this intermediate condition they await the planting season. Then set them out in two rows for the hedge, the plants being alternated thus . · . · . · . · You may prick them in twelve inches apart and let there be nine inches between the rows. In sowing, ¼ of an inch is deep enough if the seed has been properly worked to a fine condition, and of course you must keep the things watered just as you would anything else sown in the garden. The subscription to the *Journal* is only 5s. per annum.

P.M.O.

Under separate cover I am forwarding you what I believe to be dodder. Kindly let me know if it is the real dodder as I have had no previous experience with it. I am doing my best to destroy it as it makes its appearance in the lucerne. It is only in small patches and looks just like cobwebs.

C. G. Hay.

The plant transmitted is *Cuscuta trifolii* L., the commonest species of European dodder. It is imported along with lucerne seed of low quality, which has not been put through the carefully adjusted sieves which allow the small dodder seed to pass, and retain all but the very poorest of the lucerne. To save this last poor turn-of-the-scale, cutting dealers omit the sifting and chance it for their customers abroad, who, perhaps, never heard of dodder.

Since every bit of the plant, an inch long, will, if dropped upon a lucerne plant and not immediately killed out by the hot sun, put out suckers, and establish itself anew, no ordinary cutting out of the diseased portion and carrying it away will answer. Such work invariably *spreads* the plague. The only way I have seen effectual is to kill it by fire *in its place*. Cut the diseased patch out with a sickle, passing outwards from the centre, till it is all cut and pitched in a heap like a hay cock. Let it dry, and burn it when it will just fire without blazing. Keep the patch free for the season, and dress it repeatedly with dry sulphate of iron, *i.e.* green copperas which has been dried to a whitish powder in the slack oven. You may mix one lb. with five of dry earth and be liberal with the mixture. And future vigilance is even more essential than the copperas.

P.M.O.

To the Editor.

I am enclosing you an account (printed below) given me by Mr. Koch, of Drakenstein, on how to dry prunes, for publication in the *Journal*. Mr. Koch has had considerable experience and last year turned out a very superior sample of dried prunes by this process.

With regard to what he says about the dipping in hot water to kill the eggs of moths, etc., I have found in doing small quantities this can be obviated by covering the trays with fly netting while the prunes are drying. The netting is very cheap and can be had from the Secretary of the Horticultural Board.

W. van der Byl.

Prune Drying. By R. D. Koch.

The prunes should be allowed to fully ripen on the trees and gathered in by shaking the trees, picking the fruit up, then hauled to the drying ground and dipped in a solution of lye or caustic soda (98 per cent.) by boiling in an iron kettle holding, say, 50 gallons, 1 lb. of lye or caustic soda to each 20 gallons water. Have another kettle or wooden tank for cold water to rinse the prunes after their dip in the hot solution (which should be kept boiling), and renew the cold water often as it quickly becomes very alkaline. Put your prunes in a wire bucket and dip them just so long that the skins are slightly cracked. Then dip in cold water tank and spread them on the trays, lay out in the sun until they are dry, that means when you take a handful they must nct stick together, but just be nice and pliable. Now gather them in and lay in a heap on a wooden floor to let go through a "sweat," occasionally scooping them over so as to get them all equally dry. Before boxing they should be re-dipped in boiling water to kill all possible eggs of moths.

COUNTRY REPORTS.

Kokstad.

A. Rein, A.R.M., 3rd Jan., 1902:—The rainfall during the last month at the local rain gauge measured 4.1 inches, and it follows that the season continues most favourable for the growing crops. An abundant harvest may confidently be anticipated. The pasturage is plentiful and good. I regret to state that several more cases of lung-sickness have occurred among the Town cattle. Veterinary Surgeon Hutchence is now freely inoculating, and every effort is being made, in connection with the Municipal Authorities, to stamp out the disease.

Maclear.

J. Simpson, A.R.M., 31st Dec., 1901:—Over 3 inches of rain fell during the month and some parts of the district have been visited by heavy hailstorms, causing considerable damage to crops, otherwise the yield of forage has been favourable to farmers and the market rate is about 30s. per 100 bundles. The wheat crops look promising. Stock of all kinds, so far as I can learn, are doing well; there has been some sickness amongst horses, but not of a serious nature. The veldt is in splendid condition.

Matatiele.

W. Bellairs, R.M., 31st Dec., 1901:—The rainfall during the past month has continued to be good and crops of all kinds are well forward. There will be a plentiful harvest of mealies and oats and a better crop of wheat than usual. Stock of all kinds continue healthy and in good condition with the exception of a few isolated cases of lung-sickness among cattle. I am glad to be able to confirm the statement contained in my last report that rinderpest has disappeared from this district. It is at least two months since the report of the last death from this disease, and no fresh case has since been reported. I consider that the outlet for farmers has not been better during the past ten years.

Mount Ayliff.

R. L. Harries, R.M., 31st Dec., 1901 :—Mealie and Kaffir corn crops are very promising. Unusually heavy rains have fallen and much forage is damaged by rust. The pasturage is very good and stock in excellent condition. No swarms of locusts have appeared. Lung-sickness exists in quarantined areas but is not spreading.

Mount Fletcher.

J. C. Hargreaves, R.M., 31st Dec., 1901 :—During the month now closing the weather on the whole has been favourable. Severe thunderstorms, and at times accompanied by hail, have fallen throughout the District. In those parts where hail fell, I am glad to say, no damage was done as the crops are not yet big enough. The veldt still continues good and stock in good condition. Lung-sickness still prevails in several quarantined areas. A swarm of locusts passed through the District about the middle of the month, flying in a north-easterly direction.

Mount Frere.

H. B. Garner, A.R.M., 10th Jan., 1902 :—The pasturage in this district is excellent and the prospects of a good harvest of Kaffir corn and mealies are good. Lung-sickness appears to be spreading in the District, although kraals are quarantined whenever cases are reported.

Qumbu.

E. Russell, A.R.M., 31st Dec., 1901 :—There is little to add to my report of last month. Several severe hailstorms fell during the month now closing, and in some parts of the District whole crops of forage were completely destroyed. Several fresh cases of lung-sickness were reported during the month, the cattle were at once placed under quarantine and the usual precautions taken. In almost every case the cattle contracting the disease are imported from other districts and stock belonging to the district do not, so far, appear to be affected. There are up to the present no signs of any locusts in this District.

Tsolo.

W. M. Carlisle, A.R.M., 13th Jan., 1902 :—There is nothing to add to my last report. I can only say the same for December 1901.

Umzimkulu.

Captain E. J. Whindus, R.M., 31st Dec., 1901:—Abundant rains (5 inches) have fallen during the month, and the prospects of a splendid yield of cereals hold good up to the present. The grazing veld is splendid and stock of all descriptions are looking well. Sheep owners are busy getting their wool to market; the highest price yet realized is 6⅜d. per lb.

AGRICULTURE.

Report on Irrigation in South Africa.

By Mr. W. Willcocks, C.M.G., M.I.C.E.,

Addressed to His Excellency Lord Milner, P.C., G.C.B., G.C.M.G., High Commissioner for South Africa.

All Rivers and Torrents to be Proclaimed as Public Domain if Irrigation is ever to succeed in South Africa.

Having carefully read all the literature on the subject of irrigation which I have been able to obtain, and having consulted the very best authorities, at the very outset of my report I wish to draw Your Lordship's attention to the foundation stone on which alone can be built the permanent prosperity of South Africa. As Administrator of the recently acquired Crown Colonies of the Orange River and Transvaal, Your Lordship is in a position to confer a benefit on South Africa such as has fallen to the lot of few men. Apart from the development of its gold, diamond and coal mines, South Africa has remained strangely stationary. Fifty years ago it was a pastoral country importing cereals and dairy produce and even hay from foreign countries. It is the same to-day. Half a century ago it needed a farm of 5,000 acres to keep a family in decent comfort; to-day it needs the same farm of 5,000 acres to keep a single family in comfort. Except in the extreme South-Western corner of Cape Colony, agriculture has scarcely been attempted, except on the most primitive lines, and on the most insignificant areas. Farmers to-day trek from the high veld to the low veld and back again with the seasons, just as the wandering Arabs of the desert have done for centuries. The reason for this want of development of the agricultural wealth of the country, and the consequent acute stage of the poor white question, lies in the fact that the rainfall of the three Colonies, with the exception of the extreme South-West corner, is not only erratic and uncertain at the times most opportune for sowing, but is constant and heavy in autumn. Autumn again is quickly followed by a very severe and frosty winter without a particle of moisture in the air. When rain is wanted it is generally not there, when it is not wanted it is invariably present. For countries so situated the only possible means of development lie in storage of water when it is present and not needed, and its utilisation by irrigation when it is needed. Agriculture without irrigation is generally impossible in the new Colonies. In the face of such a state of affairs we find the irrigation laws of the three Colonies framed by Englishmen and Dutchmen who come from wet and foggy countries, and who considered the accumulation and storage of water as public nuisances, and the transfer of water from one valley to another as a public evil. If these countries are ever to develop the immense agricultural wealth which is to-day buried many thousands of feet below impenetrable strata of unwise and unsuitable legislation, the first step must be to proclaim the countries themselves as arid or semi-arid regions, and legislate accordingly. The whole of South Africa from one end to the other is looking to Your Lordship to take the first step in the two Crown Colonies which you administer. The moment Your Lordship takes action, the self-governing Colonies of the Cape and Natal must follow suit or take up an inferior position.

ITALIAN PRECEDENT WORTHY OF IMITATION.

When Victor Emmanuel consolidated Italy into one country, he decreed at the outset of his reign that the whole of the rivers and torrents of Italy were part of the public domain, and, as such, the property of the Government representing the people. Old irrigation rights of thousands of years' standing stood in the way of such legislation, but the Government of Count Cavour possessed a strong hand. Having decreed the rivers and torrents as public property, the Government in the same bold and decisive manner defined with great accuracy all the indefinite and vague claims of centuries, and then set itself to legislate for future concessions. Modern Italy owes much of its prosperity to this wise and strong legislation. The irrigation laws of Italy are given in great detail by Mr. W. Ham. Hall, in his book, "Irrigation development, France, Italy and Spain." These Italian irrigation laws, in great part developed by the Ancient Romans, might be taken as a model for all arid and semi-arid countries in the possession of Europeans. It is to laws such as these that vast tracts in India and the whole of Egypt owe all their prosperity. And it is to legislation such as this that all thoughtful men in South Africa are looking forward, confident that the Nation possesses in Your Lordship a man qualified in every way to take his stand by statesmen of the type of Cavour.

IMPORTANT IRRIGATION WORKS SHOULD BE CARRIED OUT BY THE STATE.

So far I have written without any hesitancy whatever. The next point to which I have to draw Your Lordship's attention is one on which different opinions have been held in the past, but on which there is to-day a great convergency to one point of view. In many countries statesmen have considered that irrigation works should be left to individuals and concessionaire companies. Such works, when of any magnitude, have been, as a rule, conspicuous failures in the hands of companies, which have been impatient to realise profits and which have in consequence forced their engineers to overtax their reservoirs and canals in their early and undeveloped stages. With works carried out by States, the results have, on the contrary, been decidedly encouraging. Canals, which in their early years have not paid their working expenses, have gradually paid their interest charges, and in the course of seven and eight years have paid profits of 5 and 6 per cent. on many millions of capital, even when the capital accounts have been swelled by all the interest charges during the early years of loss and slow development. Having served for twelve years in the Indian Irrigation Department, where the Government has spent £30,000,000 on irrigation works, and is on the eve of spending as much again, and having served for eighteen years in Egypt, where Lord Cromer's Government has carried out irrigation works which can only be approached in magnitude by the great works of the Twelfth Dynasty Pharaohs, I naturally consider the execution of important irrigation canals as the first works which an enlightened Government should carry out in an arid or semi-arid country. Not only do well-conceived and well-executed irrigation works bring in a direct benefit to the State if allowed to develop on slow and natural lines, but they also bring in all the indirect benefits which a State reaps from increased wealth of every kind. If this is the case in ordinary countries, much more is it the case in South Africa, where we have special difficulties, which, I think, can be solved by irrigation alone.

THE POOR WHITE QUESTION CAPABLE OF SOLUTION.

In young countries, where the extension and amelioration of the arable land provide outlets for the ever increasing population, the poor white question never reaches the acute stage it has already reached in South Africa with its pastoral population. The acuteness has been aggravated in the country by the fact that the poor whites of European parentage consider manual labour degrading when carried on in competition with black labour. The Colonial rebels are, in a great majority of cases, poor whites of Dutch parentage. Many Englishmen in the Colonial ranks are poor whites of English parentage. After the war is over the poor white question will be more acute than ever. Fortunately there is one kind of manual labour which the poor white considers as becoming, and that is agricultural labour. While the country is given up to stock farming the poor white has but little outlet for his energies in the only direction in which his sentiments allow him to exercise them. If, however, the State were to carry out irrigation projects, employing labour saving machinery and white labour, and then to take up along the canals such tracts as were suitable for agriculture, it would first find work for the poor whites and eventually settle them on the land with occupancy rights. Such tenants would pay a fixed rent to the landlords and a fixed water rate to the Government. They would be to all practical purposes the owners of the lands they occupied, for their rents could not be raised. They would have no power of disposing of their holdings by sale or otherwise. In this way the agricultural holdings would not be huddled together on suitable and unsuitable ground, but would be dotted about on well-chosen plots. The large landowners, as well as the tenants, would be interested with the Government in the construction of canals, for whatever rent a man might be able to obtain for pastoral land, he would be assured of at least double that amount for arable land. Legislation would doubtless be necessary, but the poor white question is sufficiently important to make it worth the while of the Government to introduce legislation to settle it.

AMERICAN EXPERIENCE POINTS TO NECESSITY OF STATE EXECUTING IMPORTANT IRRIGATION WORKS.

America is for ever quoted as a country where important irrigation works have been carried out by concessionaire companies. I have before me the most recent work on American irrigation by James Dix Schuyler, published at New York in 1901. He thus sums up the situation in his country: "Capital has been slow to undertake "the largest and most important works, because of the difficulty of "realising immediate returns from the investment. The development of a new section, upon which water is but recently introduced, "the construction of distributing canals, ditches and pipes, the "cultivation of the land and the planting of orchards—in fact the "conversion of a desert to a condition of profitable productiveness "is the work of time, which cannot be begun until the irrigation "works are actually completed, and when begun is slow of full "development. Meantime, however, the interest account accumulates, "and often is so far in excess of possible revenues as to bring discouragement, and sometimes actual bankruptcy, before a paying "basis is reached. That storage reservoirs are a necessary and "indispensable adjunct to irrigation development, as well as to the "utilisation of power, requires no argument to prove. That they "will become more and more necessary to our Western civilisation "is equally sure and certain; but the signs of the times seem to "point to the inevitable necessity of governmental control in their "construction, ownership and administration." If private enterprise cannot succeed in irrigation works of magnitude in America, it will surely not succeed in any other country in this world.

PART OF THE PROFITS OF THE MINES SHOULD BE INVESTED IN IRRIGATION WORKS FOR THE PERMANENT DEVELOPMENT ON THE COUNTRY.

I have so far drawn Your Lordship's attention to the difficulties which lie in the way of the successful prosecution of large irrigation schemes by concessionaire companies, which are eager for quick returns. There is one side, however, of the question which, in a country like the Transvaal, should not be lost sight of. The mineral wealth of the Transvaal is extraordinarily great, but it is exhaustible, some say within a space of fifty years, others within a space of 100 years. It would be a disaster indeed for the country if none of this wealth were devoted to the development of its agriculture. Agricultural development is slow but it is permanent and knows of no exhaustion. If the companies working the gold, coal and diamond mines were by decree compelled to devote a percentage of their gains to the execution of irrigation works on lines laid down by the Government, they would assist in the permanent development of the country and would be investing in works which, though slow to give a remuneration, would, at any rate, be absolutely permanent. It would thus happen, that when the mineral wealth of the country had disappeared, its agricultural wealth would have been put on such a solid basis, that the country would not have to fall from the height of prosperity to the depth of poverty. This view of the question is so important that I cannot but draw Your Lordship's attention to it, especially as it will be abundantly evident from all that I am going to say that the permanent development of the agriculture of South Africa will depend on irrigation and on irrigation alone.

THE METRIC SYSTEM OF WEIGHTS AND MEASURES SHOULD BE ADOPTED.

Before proceeding to the detailed report on the irrigation prospects of the different sections of the three Colonies, I should like to draw Your Lordship's attention to one point of less importance certainly than the questions hitherto handled, but still of sufficient consequence to be brought to Your Lordship's special notice. This point is the Metrical System of Weights and Measures. No reasoning man to-day disputes the superiority of the Metric System to all other systems. In no direction is this superiority more pronounced than in that of hydraulic engineering. To convert 9 inches of rainfall over 35 square miles of area into cubic feet is an operation as tedious as it is unnecessary. To convert 9 centimetres of rainfall over 35 square kilometres into cubic metres is an operation which a child could perform in a minute. A cubic foot of water weighs 62½ lbs., and the calculation of the pressure of 9 feet head of water on a section of a lock gate 40 feet wide and 6 feet high is an operation demanding time and exact calculation. A cubic metre of water weighs exactly one ton or 1,000 kilogrammes, and the calculation of the pressure of three metres head of water on a section of a lock gate 12 metres wide and 2 metres high can be performed in ten seconds. I personally do all my work in the metric system, and convert it with the aid of conversion tables into the ordinary English measures for the sake of those who are ignorant of the Metric System. I find that this results in a great saving of time, although I was familiar with the English system for thirty years of my life, and have only learnt the Metric System comparatively recently. In the Transvaal the Railways and the Mines already use the Metric System. If the System were made universally compulsory in both Colonies it would be a gain indeed to the whole community, from the children at school to the scientific men engaged in the most intricate calculations.

I shall now describe the different sections of the three Colonies in detail.

THE SOUTH-WESTERN CORNER OF THE CAPE COLONY.

The Koeberg District lies between 200 and 600 feet above sea-level, and is typical of the South-Western corner of the Cape Colony. The average rainfall is about 30 inches per annum. This is one of the wheat districts of the Colony. The abundant winter rains render it independent of irrigation in winter. The average size of the farms may be taken as 2,000 acres, of which about half the area seemed to be under cereals of some sort, principally wheat and oats. These areas appear to be too large for their profitable working by comparatively poor farmers, and the ploughing was done perfunctorily. There is a universal complaint against rust in the wheat. As no rotation of leguminous crops with cereals is ever attempted, but cereals are made to follow cereals with occasional fallows, this is not to be wondered at. One of the successful farmers recently sowed lucerne with his wheat in certain of his fields and has been rewarded fivefold. It is contended that there is no market for beans and other legumins in Cape Town, and that consequently they cannot be profitably grown, and that lucerne cannot survive the summer drought. If an agricultural railway was constructed through this district it would be easy to dispose of fodder, and very possibly the Egyptian clover (berseem, a legumin) would be an excellent rotation crop for a climate like that of the Koeberg, and it has a winter annual. Egypt and the Cape Colony might mutually aid each other by making an exchange of seeds. Egypt is particularly rich in legumins, while the Colony is rich in fodders capable of existing under conditions of extreme drought. A crop like the Egyptian clover grown in rotation with wheat might store the soil with nitrogen and probably destroy rust in the wheat.

In these districts reservoirs for providing perennial irrigation would be premature at present. When the landowners had thoroughly developed their single crops per annum it would be time to think of double crops. All over the Colony legumins might be grown with cereals with great benefit to agriculture. In a protected country it should not be difficult to start oil mills, make oil out of beans, and utilise the cake for cattle feeding. Both in India and in Egypt the natives consume immense quantities of lentils ("ads" in Egypt, and "dall" in India), with great advantage to themselves; while beans form one of the principal foods of donkeys and poultry in Egypt. In India, horses, sheep and cattle are fed almost exclusively on "gram," which is another lentil. A change from mealies to "gram" would be a great gain to horses and cattle in this country. If the taste for lentils was once developed among the coloured races, there would be a great demand for legumins in the Colony. The Kimberley and Johannesburg mines might encourage their workmen to eat lentils cooked with curry powder, with advantage to the workmen and to the agriculture of the Colony. Indeed, in the present condition of the meat supplies of South Africa, lentils (dall and rice) might be introduced as a food for Europeans as well as for natives. In India Europeans find it a nutritious and palatable diet. European children are brought up on it in great part. It is the main base of "Revelenta Arabica," a well-known food for invalids. And, moreover, Darwin, in the account of his first voyage, states that the best developed men he ever saw were the workers in the copper mines of the Corderillas, and they lived almost exclusively on lentils.

LANDS EAST AND SOUTH-EAST OF CAPE COLONY.

The Wynberg District may be taken as typical of this country. It has a mean height of some 600 feet above sea-level, and has a mean rainfall of some 30 inches. The rainfall is seasonable, as it is everywhere in the South-Western corner. The District is famed for its vineyards, which have been much hurt by phylloxera. Hardy American vines are in many localities replacing the depleted vineyards. Much of the grape juice is converted into brandy, which is very largely drunk by the natives, to their great detriment. If the resinous firs which are so common in Greece were introduced into the country, it might be possible to convert the grapes into the light resinate wines of the Greeks (wines which are manufactured by the smallest Greek farmers and largely consumed). These wines would do no harm to the native population, while they would insure their profits to the farmers. I make this suggestion with great diffidence, but any change from the brandy which the natives drink would be a change for the better.

THE BREEDE RIVER VALLEY.

This valley is East and South-East of Cape Town, and has rains in both winter and summer, though the winter rains are by far the most constant. The land may be taken as from 500 to 1,000 feet above sea-level. The Breede River seems to have an excellent discharge, which is scarcely utilised. The river runs in a low trough, and expansive river and canal works will be needed to properly irrigate the district, but the works will well repay expenditure. The soil of the valley is well suited for irrigation, while the rainfall is only about 15 inches per annum in the places to be irrigated, and over twice that amount in the hills where the waters of the river come from. The perennial springs are all thoroughly utilised (as they are everywhere in the Cape Colony). It is the river water which is here allowed to run to waste. No gauges have ever been read on the river, and no discharges taken. At Robertson, on the 12th August, 1901, the river was discharging about 800 cubic feet per second, and I was informed that this was the ordinary winter discharge. The summer discharge was very considerably less, while the January, February and March discharges were assumed as infinitesimal. The river may be taken as a type of others in its neighbourhood. In such rivers the water is generally clear, while the flood waters are charged with sand but never with clay. This peculiarity results in the formation of extraordinarily sandy foreshores, which will reduce very considerably the discharges of the canals traversing them. The river weirs at the heads of the canals should be made twelve feet high, and the canals taken out of the sandy foreshore as quickly as possible. If the canals cannot be taken out quickly they must be allowed 33 per cent. extra section while in the sand, and planted thickly on both banks with willows and poplars. The cross drainage is considerable and complicated, and needs for its management canal engineers with practical and theoretical knowledge. Stone masonry flank walls and wrought iron aqueducts and syphons should be freely provided for these cross drainages. In a country like the Cape Colony, where labour is exceedingly dear and occasional storms very sudden and very severe, the maintenance charge of ill-considered works will be a heavy item; I therefore recommend well-designed and solid works with low maintenance charges. If the rivers carry sand and silt in flood, and few rivers carry neither, the canals should start with an initial slope of at least two feet per mile, changing gradually to 1½ feet and one foot per mile, but all the changes should be gradual and not completed in less than six miles from the head. Where the irrigation season is in winter a duty of from 150 to 200 acres per cubic foot per second may be considered as a maximum. The type of weir recommended will be described under a special heading called "Dams and Weirs," which will come later.

VERKEERDE VALE RESERVOIR.

The Verkeerde Vale Reservoir is situated near the sources of the Touws River at a distance of some ten miles from the Touws River Railway Station. The vale is about 2,500 feet above sea-level. It is sufficiently near the South-Western corner of the Cape Colony to have its more important rainfall in the winter months. The total rainfall is some 12 inches per annum. The reservoir itself covers 800 acres and the average depth of the reservoir is five feet. The powerful Boksburg springs flow through the reservoir and help to sustain its level. A gauge has been read here for some fifteen years. The reservoir is generally at its highest in October, at the end of the winter season. As the winter and summer rains of 1896-1897 failed almost entirely, the reservoir continued to fall from the 1st January,

LU MOWING.

1896, to the 15th June, 1897, and was practically dry during the first six months of 1897. As such droughts occur periodically in the Colony, provision must be made for them in all reservoirs for perennial irrigation in the dry regions of South Africa. Such a provision could be made for them at this reservoir by raising the floor of the escape sill and gradually raising the dam. The Hon. Dr. Smartt contemplated the raising of the dam by some eight feet. Such raising should be done very carefully, as the dam is in great part built of porous sand and lies on porous sand. The new earth should be thrown on the up-stream side of the existing work after the stone has been stripped off the surface. The water should not be allowed to rise more than one extra foot per annum. The wash of the waves on the dam, according to Mr. Whittaker, the State Engineer in charge, is exceedingly heavy in summer. In the Touws River Valley in years of ordinary winter rain, good wheat crops can be grown on the alluvium of the river. These crops might be made permanent by the construction of 15 feet high weirs at suitable sites, and the leading off of small canals from the up-stream sides.

With respect to the Boksburg Springs, I should state that Mr. Whittaker informed me that the Municipality of Touws River had deepened and increased in number the cuttings into the side of the hill where the springs rise, so as to increase the flow of water. These cuttings had resulted in a decided increase of supply, but this increased supply had been temporary and had been followed by so serious a decrease in the discharge during summer that they had filled up the new cuttings and restored the spring to its normal condition. This is common sense, and should not be lost sight of at similar places elsewhere.

Lucerne Growing as Fodder for Stock.

Shortly after the appearance of Messrs. E. and O. Evans' essay which was recently republished in this journal the following criticism by Mr. Livingstone Moffat appeared in the *Midland News*. As will be seen, the criticism relates to the essay writers' comparisons of results from lucerne cultivation with those of wheat growing. Mr. Moffat says:—

For the benefit of intending lucerne growers, a full account of money invested and costs incurred should be given, so that one can see what capital is required on an acre of lucerne, for the profits which we are given are not a return from that acre only, but from the money invested on it.

In the first prize essay the average return from wheat growing obtained from reliable data is calculated to be about £4 an acre, that is nett profit. Now comparing this result with the advantages of lucerne growing for the purpose of fattening sheep and feeding cows we are given some *actual* results as follows :—

From 150 acres of lucerne from June to December a farmer made £1,300 out of fattening hamels and £700 out of butter, a total of £2,000; from this all we are asked to deduct for working expenses and costs is 2s. 6d. an acre for water leading, and £100 for tending hamels and milking of cows, leaving a balance of over £1,100 which is declared to be *clear profit* for those six months.

Then passing from the *actual* results for the six months we are asked to double them so as to arrive at a *correct* and *accurate* estimate for the results of the year. The fact that the price of butter is very different during the other half of the year is quite ignored, and we all know which is the most profitable time of the year for the disposal of fat stock.

The wheat grower, if estimates are to be calculated and comparisons made on this method, might fairly claim that the land after wheat is off be credited with a mealie crop or some catch crop for stock feeding or ensilage; and further, nothing has been allowed for the wheat straw. Now the chaff is often a valuable by-product.

The result of the above lucerne is worked out to yield a return of £24 an acre, nett. But what does that acre of lucerne represent in invested capital; for apart from the market value of that acre, there is the money invested in the cows, and in the sheep, a goodly sum, from which we need a good return to cover the interest on capital, the expenses of butter making, and to make good the losses through deaths and unsaleable hamels which are sure to occur when clearing £1,300 out of fattening sheep, for to clear that amount some 5,000 sheep or more must have passed through those lucerne fields during the six months.

It would be interesting to have the figures giving the number of hamels and cows fed on that lucerne during that time; but we are not told what was invested in the stock, so must pass on to the figures given of ostriches, showing the relative profits made on them compared with wheat-growing.

The results are worked out to show a clear profit of £24 5s. an acre, after deducting 5s. an acre for leading water, apparently the only charge; but again, apart from the value of the land there is the money invested in ostriches to stock it.

The acre according to figures quoted is worth at least £30, and the five ostriches to run on it probably £40, from which we have a return of £24 10s., against which we have to charge :—

	£	s.	d.
5 per cent. interest on £70	£3	10	0
5 per cent. for losses on birds value £40 ...	2	0	0
5s. an acre waterleading	0	5	0
3s. a bird for bones, attendance, and plucking for the five birds	0	15	0
	£6	10	0

leaving a balance of £18 or a little over 25 per cent. profit on capital. Good enough, but not too great a profit when the risks with ostriches are taken into consideration, for a heavy mortality would soon convert the profit into a loss.

The grazing of five ostriches to an acre may be a moderate estimate, but the district of Oudtshoorn has, we are told, 25,000 acres under lucerne, and ostrich farming is the main industry, yet there are, according to figures given us, only 48,888 ostriches in that district. If the average of five birds to an acre is a correct one, not half of those lucerne fields can be utilised for birds.

Before the Select Committee on Irrigation I see evidence is given there in connection with the Sunday's River Estate which estimates that "with 50 morgen of ground under lucerne you could keep 300 ostriches all the year round"; and further, the fact is stated that lucerne continues to grow in the winter sufficiently for ostriches to feed on, supplemented with hay or green barley, and there is a little but no heavy frost. Now what is the average experience in the Karoo, where hard frosts are prevalent during some of the winter months? The uncertainty of the wheat crop on account of drought or want of water for irrigation is practically *the* hindrance to the wheat grower, locusts and rust are minor and irregular causes of failure. The want of rain at the sowing time for the dry lands and the failure of water for irrigable lands are the real causes why we do not succeed in feeding ourselves and in keeping out the imported wheat.

The results of lucerne which have been given, are, bear in mind, from lands which receive a fairly certain supply of water for irrigation. Dry lands under lucerne will not give on the average season one quarter of the returns.

Now give the wheat farmer the same certainty of water he will show very satisfactory returns on the capital invested, and on the labour expended. Even with the prospects of free imports the wheat grower will always be able to obtain 12s. to 15s. a bag, that is double the declared cost of production. 100 per cent. on outlay ought to satisfy even a farmer, but why it has apparently not done so is because he needed one good season to pay for the bad returns of two dry ones.

Then wheat growing is often condemned by the small grower because he declares he cannot make a living out of it; or in other words, he expects the returns from his wheat crop which has cost him three months actual labour to keep him for 12 months, which is hardly fair to the wheat crop.

When irrigation works are the rule and not the exception I hope we shall see a large and profitable development in wheat growing, for with the certainty of a supply of water for wheat crops agriculturists will be encouraged to devote more intensive cultivation in their lands, and wheat growing will take its place in the regular rotation with other crops to the advantage of consumer and producer.

Intensive cultivation in England is the only method by means of which the British farmer can hold his own, and I feel sure that here also, even if the value of irrigable land is high, the intensive system will enable the wheat farmer to hold his own against the imported article from dry lands.

We know the world's wheat is grown on dry lands, and we know, further, that the world's wheat in general is grown in the roughest methods, giving yields so startlingly low one cannot imagine how it possibly can pay the grower; yet we are told that wheat from irrigated lands cannot compete, because of the increased cost of production on account of the expenses of irrigation and hand labour at harvest in place of machinery, which cannot work on account of the furrows, the heavy standing and irregular ripening crops; but granted the costs of labour per acre are considerably increased, the returns from irrigated lands on an average of years will far exceed the returns and profits from uncertain irregular crops from the dry lands.

The corn areas of England show an average of 26 bushels to the acre. The late Sir John Lawes by an improved system of culture secured 36 bushels, while under the allotment system we hear of an average of 40; this is the result of culture.

Given, then, a certainty of water supply with our rich Karoo soils and grand sunlight culture, we should be able to hold our own against the small returns we hear of from vast areas scratched over and yielding five and six bushels an acre.

From all I hear climatic conditions in the Karoo make wheat growing on dry lands purely a gamble with the odds against one, but with a water supply it is no longer an uncertainty and with good cultivation gives a return which pays the grower handsomely.

The advantages of lucerne growing are enormous and its cultivation will yet alter the conditions and methods of stock-farming in this country, but in comparing results with wheat growing we ought to take into consideration the great difference in capital invested per acre.

I hold no brief for the wheat grower and hope to see free importation, so as to discourage the growing of wheat on all lands which are not naturally adapted for it, either by climatic conditions favourable to dry lands or where water is available for irrigating good soils.

The protective duty only encourages and tempts the wheat grower where he would not otherwise try it.

With a fair field and no favour wheat growing will only continue where it can hold its own.

I am sure these essays on lucerne will do a great deal of good by stimulating farmers to go in for lucerne. When they see such returns and profits they will not rest till they have started irrigation works.

Destruction of Prickly Pear.

The following record of successful experiments with arsenic and washing-soda mixture, is just the kind of experience that was the lot of experimenters with the same exterminator in Cape Colony a few years ago. We publish it to refresh the minds of those who suffer from prickly pear and forget that they have a remedy so simple and effective. The report is contained in the *Queensland Agricultural Journal.*

Some little time ago, with a view to determining the efficacy of certain methods of destroying the prickly pear, which has now become such a serious and widely-spread pest, especially in the districts west of the Main Range, the Department of Agriculture decided to carry out some experiments on a badly-infested area. The agricultural adviser, Mr. Peter McLean, in order to make a thorough trial of the method decided on, selected one of the worst pieces of country in the Westbrook area. This was a steep, rocky hill, known as Bunker's Hill, situated near to and adjoining the Westbrook State Farm. The hill covers an area of about 145 acres of excellent land, thickly strewn with volcanic stone, parts indeed being so rocky that pick and shovel would have to be used if it were intended to plant the smallest tree. Nearly the whole of this area was covered with a dense growth of prickly pear, most of it of great height.

All arrangements having been made for the continuous carrying on of the work, five men were engaged on day-work. At the outset, it appeared an almost hopeless task to clear the hill, or any considerable portion of it, yet the work went steadily on, once a commencement was made, with the result that the entire hill, with the exception of about an acre yet remaining to be cleared, is covered with most luxuriant grass, intermixed with masses of beautiful wild flowers, when formerly nothing was to be seen but the unsightly prickly pear, through whose clumps neither man nor beast could force a passage.

HOW IT WAS DONE.

After several small experiments more or less successful, the Department decided on cutting down and spraying the pear with a mixture of arsenic and washing-soda in the proportion of 5 ounces of the poison to one gallon of water. To enable the men to work in comfort, they were provided with leather leggings reaching to the thigh. They were thus protected from the formidable spines and irritating hairs of the plant. Special mattocks were also made for the purpose. These have a narrow blade about 2 inches wide and 6 inches long, one end being for cutting, the other for chipping. Being very light, they were easier handled than the usual heavy double-headed mattock.

Water for mixing the spraying solution was brought up from the farm well. It will give an idea of the steepness of the road, when it is stated that three horses were required to cart up a two-hundred gallon tank of water to the site of the operations. The spray being prepared, is delivered from knapsack spray-pumps. The cutters attack the pear, chopping it down to the ground. The thickest leaves and the stem are then slashed with the mattock, the stump is torn to shreds, but not extracted. Then the leaves are sprayed as they lie, care being taken that the whole surface is thoroughly wetted. The stump is also well sprayed. This is the whole operation. As may well be imagined, the cutting down of the plant amongst masses of rock such as occur on the rise of the hill is not so expeditious as on the less stony flats, half-an-acre being a good day's work in such localities.

THE RESULT

is surprising. In from three to four days after spraying, the green, succulent, fleshy leaves wilt and turn brown, finally drying up and cracking under foot like dry pea or bean pods. Almost everywhere the spray has been applied, not a vestige of green pear remains. And not only are the leaves destroyed beyond recovery, but the spray has so permeated the stump to the very ends of the long roots that it and the roots are utterly rotted and turned into a rich humus. Here and there, more especially where the first commencement was made, a few leaves have taken root and thrown out shoots which, if left to grow, would soon multiply and spread, but on the hill, where the pear was thickest, and which part was worked at by men who were experienced at the work, the result is as stated—not a vestige remains, although some months have elapsed since the plants were killed. The whole area is now a valuable grazing property, the soil being of excellent quality, and producing abundance of succulent grass, wild carrot, and other herbs.

It must be borne in mind that the work was experimental, the site rough and generally steep, and the pear in solid masses. The carting of water was also a source of expense which would be obviated on more level land, to the extent that one horse only would be required, and that the solution could be made in quantities of 400 gallons at a time, and two spraying hoses could be attached to the tank, thus saving the labour and loss of time entailed by the knapsack pump.

It has been stated that the prickly pear will not grow on poor soil, and that its leaves, although they will throw out shoots if suspended in the air, will not grow if thrown on the ground. These are absurd statements which can be contradicted by ocular demonstration. The prickly pear will grow and thrive luxuriantly on the most barren soils. A leaf thrown on the ground will as surely strike root and produce new plants as will that of the air-plant (*Bryophyllum calycinum*). And even when a leaf has thrown out shoots and sent roots down into the ground, if it be turned over, the roots facing the hot sun, it will again send down roots from the lower surface and shoots from the upper. As one of the farmers said, "The pear seems to prefer a smooth rock or a sheet of galvanised iron." Certainly it will grow and thrive under the most adverse circumstances.

Singularly enough, the spraying has no bad effect upon the grass, which seems on the contrary to derive additional vigour from the application. The most delicate wild flowers also are seen blooming amongst the sprayed pear, and once the latter is got rid of, the growth of grass is astonishing.

The following preparations for destroying the pear were suggested by the chemist to the Department, Mr. J. C. Brünnich :—

1. *Sulphate of iron* (green vitriol), from 4 to 10 lb. being dissolved in 10 gallons of water.
2. *Hydrochloric acid* (coml.) dissolved in about 50 pints of water.
3. *Coal or gas tar*, making a spray by boiling 15 lb. resin and 8 lb. commercial caustic soda for a few hours with 20 gallons of water and adding about 5 gallons coal tar, keeping the whole boiling and stirring, and adding while still hot another 20 gallons of water, stirring vigorously to form an emulsion.
4. *Creosote oil* might be used as above.
5. *Sodium arsenite.*—4 lb. of white arsenic and 3 lb. washing soda in 1 gallon of water, boiled and stirred for half-an-hour, 5 oz. to 8 oz to be used per gallon of water.
6. *Ammonium sulphocyanide.*—4 lb. ammonium sulphocyanide dissolved in 1 gallon water, 16 oz. of the solution to 1 gallon water.
7. *Lime sulphide.*—20 lb. quicklime dissolved in 10 gallons boiling water with 5 lb. flour of sulphur.
8. Various quantities of a strong solution of copper sulphate, sodium nitrate, and potassium chlorate, in addition to the arsenious mixture No. 5.

The Department finally decided on the Sodium Arsenite spray (No. 5), and this is what has proved so successful in the destruction of the pear.

It is said that a new specific has been found which will destroy the plants without their being first cut down. If this is so, and the Department is about to make experiments with it at Bunker's Hill, a great saving of labour and consequent expense will be the result.

Artificial Manures.

The annexed list showing the agents from whom the various artificial manures may be obtained, and the current prices, is publiseed for the information and guidance of agriculturists.

Full particulars as to the composition of the respective fertilizers can be obtained on application to the agents; and attention is also invited to the analyses published in the *Agricultural Journal* of 9th January, 2nd April and 11th June, 1896; 30th Sept., 1897; 27th Oct., 1898; 13th Agril, 6th July, 1899 and 18th July, 1901.

List of Fertilizers.

		£	s.	d.	
Attwell & Co., Cape Town. (Agents for Alex. Cross & Sons, Ltd., Glasgow.)	Special Root Guano ..	£6	10	0	per ton of 2,000 lb.
	Potato and Grain Guano ..	8	5	0	" "
	Nitrate of Soda	12	0	0	" "
	Superphosphates 39/40 per cent ..	6	0	0	" "
	Scotia Basic Slag (cont. 30 per cent. Tribasic Phosphate of Lime)	4	15	0	
	Sulphate of Ammonia ..	0	19	6	per 100 lb.
	(Prices free on trucks, Cape Town)				
Jas. Searight & Co., Cape Town.	No. 1 Superphosphates .. (containing 12·14 per cent. Phosphoric Acid soluble in water, being equal to 26·30 per cent. Tribasic Phosphate of Lime). ..	£5		0	per ton of 2,000 lb.
	No. 2 Superphosphates .. (containing 14·16 per cent. Phosphoric Acid soluble in water, being equal to 30·35 per cent. Tribasic Phosphate of Lime). ..	5	10	0	
	No. 3 Superphosphates .. (containing 17·18 per cent. Phosphoric Acid soluble in water, being equal to 37·39 per cent. Tribasic Phosphate of Lime). ..	6	0	0	
	Vine Fertilizers	9	0	0	

A reduction of 5s. per 2,000 lbs. is allowed on orders of 100 bags or more. Special rates can be arranged if delivery is taken ex importing steamer, the goods being trucked at Docks.

		£	s.	d.	
Woodhead, Plant & Co. Cape Town.	Thomas' Phosphate Powder	£4	15	0	per ton of 2,000 lb.
	Superphosphates	5	15	0	" "
	Nitrate of Soda	14	0	0	" "
	Muriate of Potash	16	0	0	" "
	Sulphate of Potash	16	0	0	" "
	Wheat Fertilizer	8	10	0	" "
	Kainit ..	4	15	0	" "
	Potato ..	1	15	0	per 200 lb.
	Vineyard Manure	1	15	0	"
	Tobacco Manure	1	15	0	"
	Sulphate of Ammonia	1	2	6	per 100 lb.

Subject to a discount for cash.

De Waal & Co., Cape Town.	Jadoo Fibre	10s. 6d. per bale of 100 lb.
White, Ryan & Co., Cape Town.	Potato, Vegetable and General garden ..	£8 10s. per ton of 2,000 lb. If less than ½ ton 18s. 6d. per bag of 200 lb.
	Pure Ground Bone	£6 10s. per ton of 2,000 lb. If less than ½ ton 13s. 6d. per bag of 200 lb.

White, Ryan & Co., Cape Town.	Quick-acting Bone and Potash Mixture	£7 per ton of 2,000 lb. If less than ½ ton 16s. per bag of 200 lb.
	Selected Bone Meal for Cattle, Horses, Pigs and Poultry ..	15s. 6d. per 100 lb.; special price per ton.
	Bone Grit for Fowls ..	12s. 6d. per 100 lb.
	Superphosphates ..	Wholesale only.
Malcomess & Co., E. London.	"Malcomess" A. Fertilizer, for Potatoes, Mealies, Vegetables, Orange and other trees ..	£9 per ton of 2,000 lb.
	"Malcomess" B. Fertilizer, for cereals, especially wheat ..	£9 per ton of 2,000 lb.
	Accompanied by guaranteed analysis by Prof. Hahn ..	(less 5 per cent for cash).
James Flower & Sons, Cape Town.	"H.B.T." Gypsum	£8 10s. per ton of 2,000 lb.
	Pure Ground Bone Meal ..	£8 10s. " " (in bags f.o. trucks—Cape Town).
Government Guano :—	Ordinary Guano	£6 10s. per ton of 2,000 lb. or 13s. per bag of 200 lb.
	Rock Guano	£6 17s. per ton of 2,000 lb. or 18s. 9d. per bag of 200 lb.

For use within limits of Colony.
Price includes delivery at Cape Town Railway Station.

Western Province Agricultural Society Show.

Although this show will be of a more local character than usual owing to the restrictions placed upon traffic wide afield and the Orange River Colony and Transvaal being quite cut off, there is every prospect of a gratifying success and considerable enthusiasm is being shown by those concerned in its organisation. From Beaufort West, Swellendam and Riversdale exhibits will come along the railway lines with facility owing to the cheerful co-operation of the Military and Railway authorities. On production of a certificate from the Agricultural Society that any railway facilities asked for are for *bona fide* show purposes, persons wishing to forward exhibits will have no trouble in doing so.

No show has been held for over two years, and we have reason to hope that a considerable gathering of go ahead tillers, sons of tillers and owners of the soil will be at Rosebank on this occasion, for it will virtually amount to a foretaste of the good time coming for which everybody yearns.

The exhibits will comprise machinery, up-to-date agricultural implements; horses and cattle; special poultry exhibits (almost a show in themselves), and a comprehensive exhibition of pot plants and flowers provided by arrangement with the Horticultural and Poultry Societies. The Forest Department has also promised exhibits of trees specially adapted to the requirements of South Africa, each being labelled for the section of the country to which it is best adapted.

There will be an excellent exhibit of Fruit and Vegetables. Many of the growers in those districts that have such bountiful crops are preparing specimens of their best samples for the show.

There will be a horse-jumping competition on the upper grounds, and preparations are being made for a promenade concert in the evening in that portion of the show grounds usually used for the purpose. A first class Military Band will be in attendance during a portion of the day and in the evening.

HORTICULTURE.

The Ground-nut or Peanut.

PEANUT FIELD.

In Vol. IV. of the *Agricultural Journal,* August 1891, we published an account of this nut condensed from Bernay's *Cultural Industries of Queensland.* It is a cultural industry that ought to catch on in this country. The report referred to showed that in 1879 the American crop amounted to 1,725,000 bushels. In 1880 it rose to 2,820,000 bushels, worth £51,700. Nowadays, however, in the twentieth century, during a fair year the American peanut crop averages nearly 5,000,000 bushels, only a small proportion of the world's crop of fully 25,000,000 bushels. The Americans are said to eat about 4,000,000 bushels of the nuts yearly, either in candy or the original kernels. It is largely used to adulterate chocolate, cocoa and coffee. We again refer to the above account and add some other up to date comments as follows.

The nut resembles a dwarf coarse-growing pea-plant, with small yellow flowers, which spring in clusters from the axils of the leaves. As the fruit tends to maturity, the flower-stalk curves downward with such force as to drive the point of the pod into the soil. It is in this subterranean position that it ripens, and ultimately we have the friable thin pods, closely clasping the two or rarely three round smooth peas in the interior.

This very unusual peculiarity has to be taken into account by the grower. The soil must be light-coloured, open and sandy, without any great admixture of ochreous iron salts. Nor must it be greatly loaded with soluble humus. In either case the pods would be stained with the colour of the soil, and the product would be much less valuable, the top-price being always given for the cleanest and whitest samples. It must also be noted that, as with clover, lucerne, and other leguminous crops, the presence of lime is necessary; the peanut being more dependent on that substance than perhaps any other crop. It will grow vigorously on soils poor in lime, but does not produce its pods unless aided with a plentiful lime top-dressing added to supply its necessities.

In the States, the ground, selected generally after a white crop, is ploughed with a light one-horse plough to a depth of four or five inches only. Every care is taken to leave a firm bed below this depth, while the tilth is as open and comminated as possible. The object is to make it easy for the pods to bury themselves to the proper depth, and at the same time to prevent their going too deep for the proper quick ripening and for the easy harvesting of the produce. It is usual to top-dress with about 1 cwt. of Peruvian guano to an acre on calcareous soil, if it is otherwise at all poor. Where lime is deficient, phosphates, or a mixture of bone dust and a little superphosphate, are employed. The ground is generally finished off in three-feet beds to carry the rows, in which the clean shelled seeds are planted a foot to eighteen inches apart, covering them about an inch deep. They begin to point in about twelve days according to the temperature, the time of sowing being the second or third week in May. Any failure should be at once filled up by transplants, and these are most readily obtained by sowing one row in five at half distance. If not required these surplus plants can be weeded out.

As soon as the weeds appear a suitable light plough is run along throwing the earth from the plants and finishing with the hoe. A second ploughing is required, or the cultivator run in when the weeds reappear. When the plant has spread nearly half way across the space between the rows, the distance is split in the middle with a suitably set mould-board, and the earth drawn up to the plants with hoes, taking care to disturb the branches as little as possible, to avoid covering them, and to leave the bed open and not too high. Weeds, as met with, may be hand-pulled, but the plants will soon take such complete possession as to keep down all interlopers.

The harvest falls from the middle to the end of October (northern hemisphere), and in the States the first snap of frost is taken as a sort of guide. The longer the plants continue in growth, the greater is the percentage of sound pods. As a preliminary, arrangements are made for setting up the plants, when taken up, into small shocks. Two pieces of quartering, or something similar, are laid on the ground about as far apart as the spread of an average plant, and on these bearers are laid, with a 7 foot centre stake stuck upright in the middle. Choosing fine open weather, the plants are loosened one after the other down the rows with three-pronged hoes. Other labourers follow, pull up the plants, shake them clear of all dirt, and set them back on the land. Supposing the weather dry and open, they will be wilted out in a couple of days, and be ready for shocking. Showery weather does little harm, if not prolonged.

In lifting the plants the advantage of shallow culture and selection of sandy open soil become evident. Under such circumstances the pods are not deeply buried, and come up readily. If the depth has been overdone, there is loss by the pods breaking off at the footstalk.

The stack is built up around the central stake in the simplest manner, keeping the contents as open as possible. Air gains access at the bottom by the device of the quartering foundation. Each shock is about equal to the spread of a single average plant, and is finished off with a little straw tied to the top of the stake, and fanned out to throw off any chance rain; in two weeks' time the pods will be found dried out sufficiently for picking. Only the matured pods are picked. These are spread out thinly on a barn floor to complete their drying, fanned and cleaned for market.

Picking is tedious work, and a smart hand cannot get through more than two and a half or three bushels per day. The greatest vigilance is necessary in conducting the barn-drying. There should be a draught of air over the produce, and it should be turned over very often, else the peas will heat and get mouldy. Few crops are more frequently sent to sale in poor condition, partly from carelessness over the simple precautions above noted, and partly from want of reflection among inexperienced persons engaging in the culture. Every farmer thinks he can grow peanuts by the light of nature, and does not want to be told just those little details that make all the difference between smart work and fumbling. In marketing, a good deal depends on sorting the pods to even qualities. The trade terms are "fancy, prime, ordinary, inferior," and a lot of "prime," fetched up to bulk with a bushel or so of "ordinary" or "inferior," is sure to sell at the average price of the worst nuts in the sample. But that is a trade axiom all the world over, though many Cape producers of one thing and another are scarcely convinced of it yet.

It will be seen that a certain proportion of the peanuts break off in the ground in lifting. The result of this is that it is rather difficult to get the land clean after this crop. If, for this reason, it is grown twice in succession, the necessity for lime phosphate as manure is increased.

Perhaps the most valuable product of the ground-nut is the oil expressed from it. This is of a pale straw colour, very thin, clear, and tasteless. It does not become rancid, and is even said to improve with age. The yield is variously stated from 16 to 30 per cent., the higher quantity being assisted by heat but deteriorated in quality. Its largest use is unquestionably as an adulterant of olive oil, for which purpose it is less objectionable than cotton-seed oil. As it does not oxidize and "gum," it is used as a lubricant for sewing-machines and small household machinery in preference to the strong smelling sperm and neats-foot oil. Three qualities are in commerce, one being a substitute for olive oil in medicine, another for lamps, in which it produces scarcely any smoke and does not clog the wick, and the third makes a cheap salad and cooking oil, or serves in the manufacture of soap. It is one of the curiosities of trade that by far the largest portion of the West African output of ground-nuts goes to Marseilles, is there pressed for oil and swells the total export of what is called *olive* oil. No doubt the increasing production of this plant is one main factor in the decay of the cultivation of the olive.

The residue after pressing is mostly used as manure, at least in the warmer regions of culture, but there can be little doubt that, used judiciously in combination with other foods, it would assist in fattening cattle. Even the dry plant, after picking the pods, has a certain fodder value.

The nuts, so called, when simply parched over the fire, or when boiled, are a nutritious food, although, like all mature edible leguminous seeds, somewhat difficult of digestion. They are constantly for sale in a small way in Cape Town, but the taste for them is not so universal as in America, where (to quote the report of the Commissioner of Agriculture), "a peanut stand seems a necessary feature of street architecture at every corner."

Our illustration of a peanut field is from a photograph in the *Country Gentleman*, U.S.A., and represents an ordinary crop growing in a light warm sandy loam with an average yield of probably 100 bushels of pods to the morgen. A bushel of peanuts, shelled, can be pressed into about a gallon of oil. It sells at from 2s. 6d. to 4s. per gallon in America and would probably bring quite as much or more in South Africa.

Careful trials of this product should be made along the eastern coast lands of Cape Colony, where frost is all but unknown, and the necessary commercial requirements provided for so as to create a market.

DAIRYING.

Stall Feeding for Dairy Cows.

NOTES OF A VISIT TO MR. E. H. F. MELLISH'S DAIRY, CAPE TOWN.

Mr. Mellish is one of those heroic business men that one delights to meet. In the darkest days of rinderpest at the latter end of 1897, when terrible inroads were threatened against the flocks and herds of Cape Colony, he was one of the few stock-owners who had the courage to let his valuable imported cattle be inoculated. Many other men whom we met and heard of were dead set against the treatment, for to them it seemed like courting the disease instead of preventing it. Mr. Mellish met the Agricultural Department, heard what the veterinary experts had to vouch for, and recognising that an example was necessary, cheerfully and faithfully handed over his stock, including several expensive bulls, to the operators. His example ultimately led others to follow, and in this and many other ways the Agricultural Department were aided by Mr. Mellish. A surprise was sprung upon the community one fine day when a cattle train got near Cape Town with rinderpest aboard. Natural consternation prevailed among the owners of the non-inoculated, but Mr. Mellishcould afford to smile, and his present very fine herd of profitable milch cows testifies to his enterprise and steadfastness.

Accompanied by Mr. J. D. Borthwick, Government Veterinary Surgeon, we paid a visit to Mr. Mellish's dairy on the 16th inst, for the purpose of ascertaining the methods pursued at his establishment. The premises and grounds stand on an elevated part of suburban Cape Town, commanding a fine view of the town and harbour. The site is a most healthy one, well watered and drained. The length of the byre is 750 feet by 30 feet in width, and the height from floor to ceiling about 12 feet. It is substantially built of stone, the walls being about 18 inches thick. The stalls are 5 feet wide and are provided for 99 animals. Above the byre there is a spacious loft, where about 8,000 bales (each about 100 lbs weight) of lucerne-hay, oilcakes and mealie meal are stored for food. There is also in the loft a forage cutter run by a single horse power gas engine. This machine had just finished work when we arrived. The byre is fitted with gas fixings for lighting. It now contains the full complement of 99 animals, including 12 bulls and 42 calves from two to six months old. They are all Friesland cattle, imported or the progeny of imported stock and are in first-class condition. The whole of the cows are milked at 4 o'clock every morning and at 1 and 3 in the afternoon, 40 being milked at the former hour and the remainder at the latter time. They turn out at 7 a.m. and are stabled again at 3 p.m. They seldom roam more than from 100 to

150 yards from the byre. The yield of milk from the present stock is about 1,050 bottles, or 175 gallons per day.

The cows are fed twice a day, before they leave the byre in the morning, and after milking in the evening. The feed consists of mealie meal, brewers' grains, lucerne (alfalfa) and oilcakes. The quantity given to each cow is 11 lbs. of lucerne, 6 lbs. of oilcake, 5 lbs. of mealie meal and ½ a bushel of brewers' grains. Of course the oilcakes are only given to milkers.

Mr. Mellish informed us that no mortality has occurred among his cattle since the beginning of this year, and that last year he lost one imported bull (the first in three years) and one imported cow. Last year also one Cape cow died through over-feeding, and only one calf.

For the last two years the grass feed has been entirely dried lucerne bought from America and Buenos Ayres. Mr. Mellish does not deviate from his methods of feeding, either in summer or winter. The cows drink away from their cribs and outside the byre, so as to get a perfectly clean drink. All the animals were in first-class condition.

One cow, twelve years old, which we saw, gives as much as 47 bottles, or nearly 8 gallons of milk, per day. She had been milked twice on the day of our visit, and at 4.30 p.m., when we saw her, she was again well in milk. The prevalent complaint, when mortality has occurred, has been biliary fever.

Mr. Mellish said he was quite satisfied with his pecuniary returns from the dairy. He has a few (about 10) Colonial bulls for sale that would, but for the unsettled state of the country, have been sold when six months old. The bulls are very fine animals. The couple that are being used for the herd are magnificent looking beasts named "Pink Kop," two years old, and "Robert," rising four years.

Mr. Mellish said that several of his best cows give as much as 40 to 47 bottles per day. Questioned as to the various eating capacities of his stock and the way to gauge their needs, Mr. Mellish said: "We get accustomed to their ways, so that we know how much to give them. Of course some do eat a good deal more than others, and we test their requirements by homely methods. For instance, if a cow eagerly eats up her food, clears her box of every vestige of it, and then is apparently anxious for more, we let her have a little more. As soon as she fumbles over it, and mayhap leaves a little, then we know the quantity she can safely take. She has had enough, and it is probably wise to give her a trifle less than the maximum quantity thus ascertained."

We call attention to the fact that the majority of dairymen feed their cows during milking time. An experienced correspondent in the *Journal* of 16th inst. says such a course is absolutely necessary. However, it seems Mr. Mellish has got his cows accustomed to contentment with the cud merely. There is no doubt a good deal in custom, but as the wider custom is to feed while milking, and universal testimony says it is better, we would prefer to go with the majority if we ran a dairy.

STOCK FARMING.

The Queensland Redwater Immune Cattle for South Africa.

An extremely interesting experiment is being tried in Natal described as follows by Dr. H. Watkins-Pitchford, F.R.C.V.S., Director of the Natal Veterinary Department, in the *Natal Agricultural Journal.* It will be observed that the addresses of the gentlemen who have taken charge of the cattle are given :—

As previously announced, the shipment of young stock from Australia has come safely to hand, and the results of the experiment will be followed with great interest by all stock-owners throughout the Colony. If these animals prove to be immune to further attack of the redwater organism, the importance of the venture will be difficult to over-estimate, for there is no doubt that great advantage will be taken of this knowledge by farmers, both in the improvement of existing herds and also in the re-stocking of farms depleted by disease and war.

The shipment consists of about 100 heifers of from one to two years old, and three young bulls of the Ayrshire breed, about the same age. The animals at first sight strike one as being, in many cases, somewhat undersized for their age, but it must be borne in mind that the object of the Government in introducing these animals into South Africa has been solely that of establishing the possibility of stock raised in other redwater countries being able to survive South African conditions. If this fact is happily established, the importation of more valuable stock will be undertaken with greater confidence, not only from Australia, but from other districts of North and South America the stock of which has attained to a similar degree of immunity from this disease.

Through difficulties of transport, etc., these animals are arriving several months after the time arranged for, and will now be placed upon our Natal pastures at the height of summer, and at a time at which their powers of resistance to redwater will be likely to be tested to the utmost. When it is remembered that these heifers have been drawn from a redwater district—that is, one in which the disease is endemic, and in which the stock are to a great degree immune to the disease—and that, in addition, they have through the kindness of the Queensland Government authorities been subjected to a severe test of susceptibility by the injection of virus, it will be seen that steps have been taken to render the result of the experiment conclusive. To the enterprise of Mr. Joseph Baynes, of Nel's Rust, the Colony must ever remain indebted for a spirited endeavour to prove that Australian immune cattle can survive Natal conditions. The S.S. *Kadina,* which was the boat bringing the 100 Government heifers, was chartered by this gentleman for the transport of a large shipment of immune cattle, and this fine herd will afford corroboratory evidence of a most valuable nature upon this redwater question, which has so long and so heavily retarded the cattle industry of the Colony.

Viewed from a practical point of view there seems no reason to think that these animals will fail to withstand the conditions of the Natal veld. All the losses in the past, in this connection, can probably be traced to the failure on the part of the owner to assure himself that the imported animals were drawn from a district known to be immune to the disease. Conditions of acclimatisation, change of food, etc., have probably but small influence upon the ultimate question of survival, and, if these animals enjoy as high a degree of immunity from the disease redwater as we hope, it is probable that they will live amidst any of the various climatic conditions of our Colony, from Durban to Charlestown, without difficulty. All these animals have been inoculated against quarter-evil, and are shown to be free from tuberculosis by the tuberculin test.

The following gentlemen have consented to take charge of small numbers of these animals until such time as the result of the enterprise can be accurately determined:—F. Churchill, M.L.A.; T. H. Hindle, Gilletts; Mapstone Bros, Thornville; J. W. Mackenzie, Richmond; M. A. Sutton, Howick; Hutchinson Bros., Balgowan; J. King, Nottingham Road; P. D. Simmons, Mooi River; E. B. Griffin Willow Grange; J. W. Leslie, Ennersdale; H. A. Greenhaugh, Glencoe; Pepworth and Reid, Ladysmith; E. A. R. Johnstone, Newcastle.

ENTOMOLOGY.

The House Fly.

I once met a man who was kindly disposed towards the house fly, who confessed to a fondness for its company akin to that felt for the trusting robin red-breast that comes to the door-step at home when snow covers the ground, who was not annoyed when an over-adventurous fly dropped into his coffee, and who never exerted himself to destroy the busy ones which strove to share his sugar. His house was kept scrupulously clean, and flies consequently were not numerous therein, or he might perhaps have held different views concerning these little buzzing guests. He told me he honoured the fly for its intelligence, for its extraordinary vision and the beauty of its complex eye structure, and, most of all, for its peculiar attachment to the habitations of man throughout the wide world. He seemed well acquainted with the creature as a fly and in the house, but, strange to say, he had never probed its earlier history or enquired into its out-door habits; and his respect for the little insect seemed so genuine and unaffected that I forbore from enlightening him. Ignorance to him was indeed bliss. And if any of my readers hold similar views, if they have any affection at all for the house fly and desire to retain it, they had best read no further. My design in penning these notes is to malign the little pest, to lay bare its iniquity, to brand it an abomination of the vilest type, and to instil loathsomeness toward it. I have only one pronounced feeling for the house fly, and that is of deep disgust. Other creatures there are a plenty of equally offensive production, but the house fly is preeminent for habitually insinuating its low-bred filthy self into man's abode, by fouling our food and drink with its dung-stained feet, by soiling our all with its flecks of excrement, scattering germs of foul disease for our injury. We rightfully abhor *Acanthia lectularia*, the mahogany-backed frequenter of so many colonial beds by night, whose name we even taboo, a creature nourished wholly on the purest food, man's red blood, and who has the decency to keep himself hidden from sight, but the most of us are seemingly utterly indifferent to the filth-bred house fly in our shops and dwellings. Recall how it throngs in eating saloons, say those along the railway in the great Karroo, how it invades the bake shops, and swarms in the meat stalls, yes, swarms in myriads, blackening the windows and shop fixtures even in the depots of the gigantic meat monopoly whose handsome profits for the past year totalled to seven figures, with each unit a sovereign.

LIFE CYCLE OF THE HOUSE FLY.

The number of distinct species of flies is legion. One great authority asserts that there are 40,000 described kinds. Each one of these thousands, mark you, is distinct from its fellows, as distinct from its nearest relative as a sheep from a goat. Of all the number, only about half a dozen habitually enter dwellings, and of these few none compare in abundance with the one species, *Musca domestica*, which is the universal "house fly" and to most people "the" fly.

It is customary in discussing an insect to describe it in detail, treating at length of its dimensions and colours and its prominent characters. Such information will be omitted in the present consideration of the house fly, and anyone who feels the need of it is recommended to stop reading for a few minutes whilst he finds and examines a fly. If he lives in any part of South Africa, he is a lucky man if he has to look far for a specimen at this time of year. One feature of the fly's anatomy only is it desired to specially mention; that is, the mouth part. This ugly organ is thick throughout and extends downward from the head to the ground as the fly stands naturally in feeding but is retracted almost out of sight at other times; it is much expanded at the end and is fitted for lapping and sucking, not for piercing. The fly that pricks the skin, or stings at all, is not the house fly, however much it may look and buzz like one.

The house fly is an insect which undergoes complete metamorphoses in the course of its development. It is first an elongate white egg.

This hatches very quickly, sometimes, it is recorded, in less than a third of a day, into a squirming, footless white maggot. The maggot grows rapidly in size, sloughing its skin twice, it is said, and in about a week in warm weather it is about three-eighths of an inch in length and full grown; then it superficially resembles the well-known maggot that we find in our peaches, but it is hardly as plump, is slightly longer, more translucent, and of a more sordid white in colour. The full grown maggot becomes quiescent and retracts in length; its surface then hardens and darkens to a deep chestnut colour, and thus insensibly the insect enters the pupa stage. In five to seven days the top of the pupa case or puparium bursts off and there emerges the perfect insect, the fly. Thereafter it grows inappreciably in size; and therefore there is very little difference in size between one house fly and any other.

Farmers in many parts of Cape Colony believe that the house fly is the mature form of the spittle insect so common on the rhenosterbosch; this wholly erroneous notion probably arises from the appearance of the house fly in immense numbers at about the time the spittle insects acquire wings and disappear from notice.

BREEDING SEASON OF THE HOUSE FLY.

The house fly is an all-the-year pest near the coast in South Africa. At all seasons the maggots may be found in active development about Cape Town, and a winter visit to a cattle kraal on the Karroo will convince one that even in the higher altitude of the interior the adults remain active in numbers through the cold months. The late spring, summer and fall, naturally, are the seasons when the species becomes most numerous. It begins to get really troublesome very early, often by the 1st of December in some sections. Cold prolongs the duration of all the life stages, but only the adult is supposed to actually hibernate and to thus tide the species over in countries where the winters are severe.

Generation rapidly succeeds generation throughout the warm months. Dr. L. O. Howard, the United States Government Entomologist, thinks there may be fully a dozen generations at Washington. As the winters there are far longer than at the Cape, there are probably even more broods here. The eggs appear numerous. Dr. A. S. Packard tells that a specimen which he enclosed in a bottle deposited 120 in the course of a day, and Dr. Howard gives this number as the average laid by a female.

BREEDING PLACES.

The mission of the house fly is that of a scavenger, which duty it industriously performs in its larval stage. Most writers consider the work it accomplishes a sufficient excuse for its existence; but, personally, I believe we could very well dispense with its services. Scavengers galore are there of less annoying kinds that would do the work of the house fly quite as effectually as the fly itself and which have not the trait of objectionable familiarity. The pity is that, though 'tis said the earth was made for humanity alone, man is so feeble a power that the suppression of the house fly is hopelessly beyond his wildest dreams. How helpless we Cape people would be in any effort to control its numbers, we who cannot master even sheep scab!

Common everywhere as the house fly is, and well known in its fly stage as it has been for ages, very little is recorded of an exact nature regarding its breeding places. Horse dung is usually given as the chief food of the maggots, and perhaps greater numbers do develop in that than in other substances. At the Cape, cow dung, too, seems a favourite food, and the dung of other animals is freely infested. The maggots are not hardy creatures and succumb if their food dries out. They appear to thrive very well in pure horse dung, but, for their best welfare, most other sorts are too compact unless well trampled into loose moist soil or mixed with coarse rubbish like straw. The ideal breeding place appears to be manure mixed with bedding and almost saturated with urine. Dung dropped in open pastures harbours few, for under our South African sun the droppings are dry enough to burn long before the maggots can mature. Few, too, seem to infest manure taken into fields and spread at once. Droppings in large quantities in cool, shaded spots, as where horses and cattle congregate during the heat of the day or where they sleep at night, however, are often abundantly fruitful in flies. The most favourable of all conditions for them are found in slovenly-kept stables, and almost all stables serve as breeding places. Last year I kept half a dozen goats in a brick-floored stable. Circumstances made it expedient to keep the bedding down from one week's end to the next. Hence the accumulation of dung and bedding was considerable and the odour of ammonia terrific when the matted mass was disturbed. Always the sloppy layer next to the floor contained numerous maggots, but the burying of all the refuse and a thorough scrubbing of the floor prevented these from maturing. Owing to a rain the cleanings were piled in a corner instead of being buried one week, and the result, as was foreseen, was to fill the stable with flies.

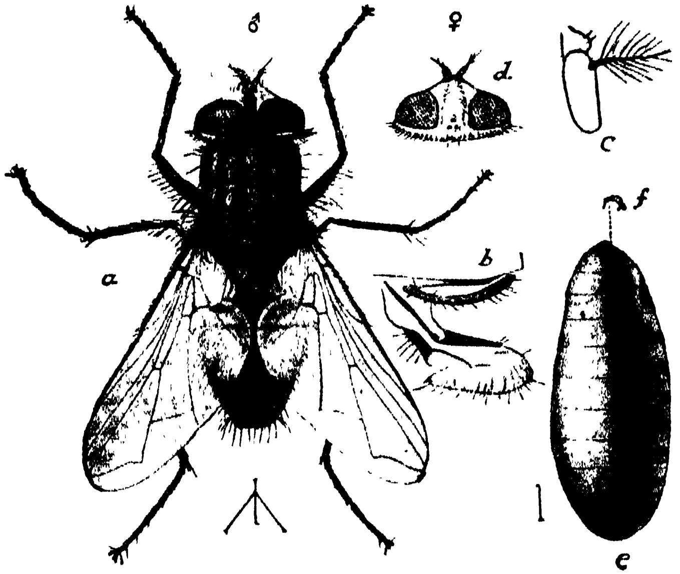
"Door-yard filth" is said to give sustenance to the maggots by some writers. I have not verified this assertion, but believe it to be true. The refuse of Cape Town, consisting of garbage, floor sweepings and shop cleanings, and all other sorts of rubbish, is dumped out on the sand barrens eight or ten miles from town. It assists in the reclamation of these wastes, but incidentally it appears to give rise to myriads of flies. The country round about the dumping grounds is pested with the creatures more than any other section I have ever visited, and this is saying a good deal for one who has travelled much in South Africa. Probably an important secondary source of flies in the sand flats is the manure brought out from city stables. Owing to flies from the same source, suburban homes sometimes become almost uninhabitable, the weather conditions chancing to favour the complete development of the innumerable eggs deposited before or during the transport.

THE HOUSE FLY AND DISEASE.

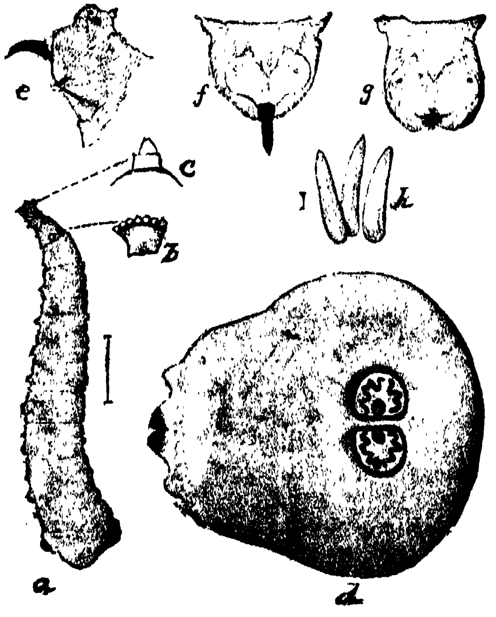
Many of the habits of the fly are painfully familiar to all of us. Its discordant buzzing, its exasperating persistency in returning again and again to our sensitive bald spots, setting our nerves on edge with the tickling of its feet and the rasping of its proboscis and its headlong floundering into the milk jug and coffee cup; likewise its habit, so distressing to the careful housewife, of marking its path, especially on newly-polished mirrors, with little dots of brown-black excrement, are well known to almost everybody. If the fly was a cleanly insect, the importance of these associations with man and man's belongings would be limited by the temporary annoyance caused. But the house fly is far from cleanly. It breeds in dung and returns to dung to lay its eggs, it flits direct from suppurating sores on the skin of animals to regale itself on our perspiration; it visits stercus and then, perhaps, the milk pail.

Numerous diseases, some of them most serious in character, may result from the visits of the fly to our food and our persons, for it oft brings with it virulent germs from the fæcal or putrid matter which it has visited. It has been demonstrated that the fly can contract plague from feeding on animals that have died of this disease, and that, having contracted plague, it may live for several days and finally fall or drop dead on to food, meanwhile having been depositing excrement laden with virulent bacilli. It is firmly believed by medical men in India that cholera is very frequently transmitted by the house fly. Tuberculosis bacilli are taken up by it through feeding, as it often does, on the sputum of consumptive persons, and these germs are given off in the excreta. The excreta of flies that had been fed on infective sputum, when injected into rabbits, has given rise to tuberculosis. But of all diseases that it may transmit, typhoid or enteric fever probably ranks first in importance. The dejections of persons infected with this disease, it has been stated on the best of authority, harbour the causal organism not only during the period of actual illness, but for some days before and for some time after apparently complete recovery. The fly becomes contaminated by alighting on dejections that have not been properly disinfected, and then may carry the germs into surrounding households. The bacilli multiply rapidly in milk, and how easily can a fly render a whole pailful poisonous by falling into it or even simply sipping it! In cities and towns with good sewerage systems and well-enforced sanitary regulations, the carriage of typhoid by the fly is doubtless exceptional, but in concentration and army camps it is presumed to be very common.

Not only may the fly convey infectious diseases but, it is asserted, some of the worm parasites that afflict humanity as well. The eggs of the tape worm and of the tiny thread or pin worm were found to pass unaltered through "flies" (presumably house flies) by an Italian investigator; and an American zoologist found that fly maggots (of genus *Musca*, species not stated) will devour the common round worm, and that the eggs of the worm are passed off alive in the



THE HOUSE FLY, *Musca domestica*: *a*, male fly; *b*, proboscis (below) and palpus of male; *c*, terminal joints of antenna; *d*, head of female fly; *e*, puparium; *f*, anterior spiracle. All figures much enlarged. (From Howard, Ent. Bull. 4, U.S. Dept. Agr.)



THE HOUSE FLY, *Musca domestica*; *a*, full grown maggot; *b*, one of its breathing orifices; *c*, side view of head; *d*, hind end of maggot showing anal breathing orifices; *e*, side view of head; *f*, top view of head; *g*, top view of head of young maggot; *h*, eggs. All figures much enlarged. (From Howard, Ent. Bull. 4, U.S. Dept. Agr.)

excreta of the winged adults. The excreta may be dropped on food and the contained eggs carried into the intestine, where they can develop. It is probable that the life circle of the worm normally depends on such an extraordinary sequence of happenings for its completion, but as the eggs are almost numberless the survival of the species can safely rest on very slim chances of one egg, or indeed of any one egg of a thousand, becoming lodged in the intestine.

REMEDIES FOR FLIES.

The fly evil can be abated to some extent on many premises by measures aimed to prevent the multiplication of the creatures. The thorough cleansing of stable floors even once only in a week, and the keeping of all the manure in pits from which flies cannot escape, or of spreading it on to land where it will dry out quickly, are practical measures of high value to which effect may be given under some circumstances. The maggots swarm in floor crevices and in corners of stalls where dung collects, and hence the necessity of thoroughness in cleaning the floor.

To minimize the risk of disease transmission, human fæces should never be left exposed, and those from persons ill with infectious diseases should be at once disinfected. Where the bucket sanitary system prevails, as in many of our colonial cities and towns, a cover to prevent the access of flies should be used and the bucket cleaned at least once in ten days. I have noticed fly maggots innumerable in buckets left standing a fortnight even under covered seats, but I am unable to say whether or not these were of the house fly; presumably they were, as no other kind of fly was present in the immediate vicinity. The natives, and the coloured people generally, in South Africa are disposed to ignore closets, and their outdoor deposits are a source of danger in all of our towns. The destruction of the dense underbrush on vacant house lots and an earnest effort on the part of municipal authorities to enforce existing sanitary regulations would do much towards lessening the evil, now so pronounced in the outskirts and suburbs of Cape Town. The blacks are not altogether alone in the deplorable laxity alluded to, either in the city or country. On many an otherwise well kept farm, closet provisions are of the most primitive character and often entirely lacking. The adoption of deep, securely covered pits in connection with the liberal use of dry earth would do much for comfort and healthfulness at slight expense; though when arrangements for burying the contents at frequent intervals, say once a week, can be made the use of buckets and dry earth is preferable. The terrible mortality amongst native children on farm locations is probably due in large part to fly-transmitted disease; flies swarm about the huts, the place frequented for defecation is generally in bushes not far away, and there, too, the flies swarm.

Small mesh nettings at the windows and doors to exclude the house fly are almost unheard of in South Africa; yet everywhere in America one sees dwellings thus protected. Incidentally the screens afford relief from mosquitoes and lessen the dust. There are nets and nettings to suit all purses. The poor people are often satisfied with cheap cotton netting of the quality imported into the Colony for use over peach trees to prevent fruit fly attack. These nettings are tacked over the window frames outside and let hang loosely in the doorways. The cost is so trifling that they are torn off and discarded when cold weather renders them needless. Shopkeepers everywhere make liberal use of these cheap nettings in the fly season. Grocers use them to screen their shelving, butchers to cover their meat, bakers to shield their cakes and pies, fruit dealers to keep the common foe from the foodstuffs they handle, and barmen to enshroud the chandeliers and pictures in the liquor saloons. The nettings are made in white, black, green, red, pink and other colours and really lend themselves to decorative effect. Fruit growers often send their choice fruits, peaches especially, to market in baskets covered over with cardinal netting; the flies are kept off and there is less pilfering. Wire or linen nettings are more commonly used than the cotton fabrics for screening windows and doors even by the poorer classes. An immense trade is done in ready-made screen doors and adjustable window screens, agents for manufacturers canvassing the country everywhere for orders, and nearly all house furnishing stores keeping large supplies of standard sizes on hand. The window screens may fit under the lower sash or between the beadings, being held in place by spring sides, or may be made to slide on cleats attached to the beadings. The doors are usually hung on spring hinges so as to be self-closing, and they are fitted with locks that the ordinary doors, with which there is no interference, may be left open in safety. The nettings admit air freely, but break the light to the extent that a person within the room can see out clearly, but one without can see in only dimly.

The value of sticky fly papers, the best of which is that styled "Tanglefoot," of sticky fly strings, of poisoned fly paper, and of wire fly traps are well understood by most housekeepers. All these devices for reducing the numbers of flies have their disadvantages, yet with due regard to circumstances they are all highly commendable. Sticky fly paper is the least objectionable, despite the buzzing of the victims and the risk of catching one's clothing. Poisoned paper is somewhat dangerous where inquisitive children and pets are about, and besides, it is rather disagreeable to have dead flies dropping into everything. The art of driving flies out of a room seems almost unknown by the majority of Colonials, but driving them out is one of the best ways of getting rid of them. The room to be cleared is darkened except at one partially opened door or window, and the flies are "shooed" with a whisk or cloth to this exit; they move readily towards the light when disturbed, but some skill and patience is required to get them all to leave. Even without more trouble than simply darkening the room and leaving a lighted exit, many of the flies within will pass out; it is a good practice to thus treat dining rooms between meals.

Pyrethrum powder, otherwise known as insect powder, Persian powder, Dalmatian powder, and most familiarly as Keating's powder, is excellent for use against flies. Some people like to blow an ounce or two with a powder bellows into the closed room at night, others to burn a little on coals or in a roll of twisted paper, but the first method involves a layer of dust and the second a peculiar odour that remains for days, while both necessitate the sweeping up of the stupified victims in the early morning. The neatest way to use it, I think, is to dust it liberally on the window ledges and sills, the windows being closed. When the other sources of light are shut off the flies sooner or later seek the windows and one by one are overcome by the volatile oil of the powder and drop senseless. In the writer's house, the fly is kept almost completely suppressed by darkening the rooms on the days that flies most commonly seek to enter, dull days when rain threatens, by keeping food under cover as much as possible, and by keeping the dining-room, kitchen and pantry dark at all times when not in use, together with the exertions of madam with her butterfly net. Thanks to these measures, it is seldom that a dozen flies can be found in the whole house even in the height of fly season and when the dwellings of neighbours swarm with the nasty pest. Catching the fly with a butterfly net may seem a childish measure, but it is really a quick way of clearing a room by one who knows how and has a wide deep net.

There is a section of the public of late years who believe that every insect has sufficient natural enemies to hold it in close check and that insects are only pests through reason of having been separated from one or more of these enemies. I should like to hear one of these people apply his theory to the house fly. It is an insect that seems to be known throughout the world and to pester man everywhere. Natural enemies it has to be sure, but who thinks of these in connection with its abundance? Aside from climatic conditions, the factor of overwhelming importance governing its numbers is not parasites or predaceous enemies, but the question of food supply. Furnish it with an abundance of suitable manure to breed in, and its natural enemies, as far as I can see, have no appreciable effect on it. I greatly fear it is the food supply factor and not the absence of the "proper enemy" that accounts for the pestiferousness of many insects that attack farm and orchard crops. The house fly is preyed on by various small animals as toads and some lizards, and every child knows how some spiders ensnare them. A certain species of long-legged centipede, *Scutigera forceps*, an uncanny creature one sometimes sees scurrying over the walls at midnight, is credited with being an enemy of some importance. So is a tiny red mite, like a small tick, that infests the body of the fly. Then hymenopterous parasites and predaceous beetles are recorded to destroy the maggots; and, lastly, a fungus disease accounts for many of the adults. Specimens which have succumbed to the disease are often to be seen adhering to window glass, surrounded by a halo of white fungus filaments. All over the world the house enemies of the fly seem to be the same.

All through these pages, the remarks have been confined to one species of fly, *Musca domestica,* but, as stated near the beginning, half a dozen kinds of flies have the habit of intruding themselves into dwellings. In general what has been said of remedies applies equally well to the others. Most of them, like the house fly, are creatures of filth, but as they are far less abundant indoors they are correspondingly less dangerous to health. Dr. Howard recently had collections of flies caught for him in dining rooms and kitchens in different parts of the United States, and of the 2,300 specimens he received, ninety-eight per cent. proved to be the true house fly. Next to the house fly, a species called the stable fly, *Stomoxys calcitrans,* is reported to be the most abundant kind in houses in the United States. This fly would be mistaken for the house fly by ninety-nine people out of one hundred, but it is quite distinct and has a hard pointed proboscis with which it can pierce the skin instead of a broad-tipped, fleshy, retractile one. It is common about Cape Town out-of-doors, and greatly outnumbered the house fly in a recent rearing of material from cow dung.

In closing let me urge you to always remember that the everywhere common house fly is a creature of foul and filthy habits and one liable to bring misery, disease, and even death into your household. Therefore spare not a little trouble to make its existence a hard one on your premises.

CHAS. P. LOUNSBURY,
Government Entomologist.

TRADE RETURNS.

The Season's Fruit Export.

The fruit export trade for 1902 began in earnest with a shipment to London by the *Carisbrook Castle* on the 2nd of January, and regular weekly shipments have followed. Plums and peaches, so far, have been in the preponderance. Pears, apricots and nectarines have gone in small quantities. The principal plum varieties sent are Burbanks, Simoni, Oregon (a few cases), and a particularly fine looking lot of Kelsey and Wicksons, and large peaches of excellent quality from the Stellenbosch division have also been sent. The pears exported are Bon Chretiens grown to maturity but picked almost green. As is well known they ripen well after gathering and are therefore very suitable for export in a semi-green condition, not necessarily ripening *en route* but soon doing so on arrival if placed in a warm, well-ventilated apartment.

The total shipments up to the 22nd of January were 746 crates and 749 boxes of plums, 3 crates and 873 boxes of peaches, 114 boxes of apricots, 12 boxes of nectarines and 170 boxes of pears. It is noteworthy that the whole of this fruit, except about 200 boxes of peaches, was sent by members of the Fruit Exporters' Association of South Africa, and even about 70 boxfuls of the latterly mentioned peaches were grown on the farm of a member of the Association. The districts thus exporting are: Paarl, 746 crates 57 boxes plums and 3 crates 124 boxes peaches; Stellenbosch, 338 boxes plums, 499 boxes peaches, 114 boxes apricots, 4 boxes nectarines and 9 boxes pears; Worcester, 399 boxes plums, 137 boxes peaches, 4 boxes nectarines and 161 boxes pears; Constantia, 113 boxes peaches and 4 boxes nectarines.

A Decade of Colonial Exports.

A pleasant quarter of an hour with Figures, Facts and Reasons. So might we designate the following array of returns relating to the Colony's exports for the past ten years. It is a case in which hard facts are pleasant reading, for those especially who are in close touch with the Colony's affairs and are conversant with local cultural and industrial matters.

In 1891 we exported £1,000 worth of fruit; five years later this reached about £4,500, and in 1900 the amount was £9,000. Of course, like the items that follow, we are now dealing with *exports* purely, so that the above figure, not being a criterion of our output, is satisfactory when we consider what a large quantity of fruit our own markets absorb. Meal experts for the same period rose from £4,000 to £5,000 in 1892, dropped in 1893 to £3,000 and remained at that figure till 1895, when it receded to £2,000; took an upward bound to about £6,000 in 1896, reached the imposing height of £14,500 in 1898 and went back to £10,500 in 1900. Of course, as is probably well known, these fluctuations were due to the varying seasons, and the rise and depression of prices not only in this Colony, but in the large grain-producing centres of the world to which the wheat trade owes its ebb and flow. The return would scarcely be affected by the exigencies of warfare owing chiefly to the fact that the authorities have been their own importers.

Everlasting Flowers made their mark by rising, at the starting period, from over £4,000 to £12,000 in 1892, and £20,000 in 1893; fell back to about £6,500 in 1894; rose to £11,000 in the following year and again to £20,000 in 1896; slipped back to £11,500 in 1897 and again attained £20,000 in 1900. The fluctuations in this case were undoubtedly caused by the varying demands of foreign markets and the occasional limited growth of a bad season.

Exports of Horns starting at £5,500 rose in 1898 to £12,500 and reached to between £3,000 and £4,000 in 1900. The rocket-like rise in the year mentioned is accounted for by the collecting of the horns of rinderpest-stricken cattle in addition to the ordinary supply. We sent away £9,000 worth of grain in 1891, only about £2,000 in 1892, £11,000 in 1899, and £4,000 in 1900, these fluctuations being due to and keeping pace with the season's output at home and abroad.

Wine and Brandy have maintained a slow and sure up grade movement, for in 1891 we exported a little over £20,000 worth; in 1896 about £25,000, which after falling again to and remaining at £20,000 in 1897 and 1898 leapt upward in 1899 and 1900 to £40,000. Larger returns than these would probably have to be recorded if our wines and spirits, good as they are, were of such a uniform class as to make it worth the exporter's while to market them extensively abroad, and were it not that a large section of the South African public have happily begun to appreciate our wines and spirits and consume large quantities of them in preference to the imported article.

After keeping a fairly even course for several years, Fish suddenly took a dive downward in 1898 from about £20,000 to less than £16,000, rose again in 1899 to £20,000 and, scarcely waiting to take breath, dived again deeper than ever, to £12,000 in 1900. To-morrow may see fish up again to £20,000 or more, for to the capriciousness of the tribe is due this enormous falling off. For the last two or three years the large shoals of snoek which frequented Cape waters and were such a popular export, have unaccountably left our shores. The stagnation in the fish trade at Malmesbury and Piquetberg is due to a like cause, namely, the disappearance of the fish that made the market.

From about £60,000 in 1891 our export of Hides reached and remained at £200,000 in 1897 and 1898, dropped to between £80,000 and £40,000 in 1899 and left off at £12,000 in 1900. Horns and Hides had their big rises from very similar causes, and both will probably answer to a big demand from abroad as soon as the country trade can pull itself round again. Copper Ore started at and wobbled between £200,000 and £300,000 till 1898, when in response to the great demand that arose for copper in Europe the two private mines in Namaqualand which represent our copper industry rose to the occasion and exported £500,000 worth in 1900. Mohair from £350,000 reached £750,000 in 1899, but showed only £500,000 in 1900. Fashion is responsible for the boom indicated, and the fickle jade quickly dropped mohair back to a normal condition. We look for a continuance of the steady and gradual increase that distinguishes this product. Skins have had the most uneventful course of all our exports, starting and remaining at about £400,000 for several years and receding during the war to about £300,000. It seems strange that the export of Ostrich Feathers has increased during the war. Starting at £475,000 they slowly crept up to and remained at about £525,000 in 1895 and 1896, and took a rapid upward turn till the export stood at about £875,000 in 1900. Wool from about £2,250,000 in 1891 fluttered down to £1,500,000 in 1894; increased to £2,125,000 in 1899 and fell again to £825,000 in 1900. The great fall is of course owing to the large stocks in Europe and low prices accordingly. And last, but not least in the list of exports, Diamonds starting in 1891 at £4,125,000 amounted in 1894 to £3,000,000 only, but next year touched high level at £4,750,000. In 1900 the export was £8,500,000.

British Trade with South Africa in October.

EVERY PREVIOUS RECORD ECLIPSED.

The Highest Monthly Total Yet Chronicled.

The recurring monthly totals of the shipments of British goods to South Africa are steadily shaping themselves to realise the repeated forecasts we have made of an aggregate record for the current year that will exceed all precedents. As a further contribution to this happy result, the total exports of the 32 principal articles from the United Kingdom during October reached the abnormal sum of £815,148, which is far and away the highest amount for any single month hitherto chronicled. In this connection it is interesting to note that only in the cases of four preceding monthly results has the value of the British share ever exceeded £700,000, the highest previous figures (£755,895) having been in March in the boom year of 1897. It will thus be seen that the October totals overtop those of the month referred to by the not insignificant sum of £59,753. In natural sequence the nine months' aggregate totals of exports, and the ten months' exports of principal articles, exceed all previous figures of any similar corresponding periods to the extent of nearly a million sterling. With only comparatively moderate returns for the closing two months of 1901, which are not even to be expected, this promising showing cannot possibly be reversed, so that the bumper year prognosticated may with confidence be looked upon as already assured. It is as well, perhaps, to reiterate that this volume of business consists exclusively of civilian merchandise, although it is only right to point out that much of the increase is indirectly due to the presence of the army in South Africa. In any event, it is only the foretaste of the expanded demand which will arise as the country settles itself gradually into its former industrial grooves. In view of the fact that the October returns of British trade with other markets again show an enormous decline, it will be admitted that the brave showing which South Africa has made, and will doubtless continue to make, is highly encouraging to British manufacturers, and will serve to compensate them, in however small a degree, for the loss of trade elsewhere.

THE IMPORTS FOR OCTOBER.

The British consumption of the six principal articles of South African produce during October amounted to £720,951, as compared with £319,703 in the corresponding month of 1900, thus showing an increase of £401,248, equal to 125 per cent. This is due not only to the improved importations of gold bullion and specie, amounting to £428,136, against £59,630 in the previous period, but likewise to the larger shipments of wool, £197,502, against £49,647. All other items showed decline, mohair leading with £106,807 on imports valued at £74,401, while copper ore exhibited a fall of £7,911. Of lesser importance were the diminutions shown in specie and wine.

Article.	October, 1900.	October, 1901.	Increase.	Decrease.
	£	£	£	
Gold bullion and specie	59,630	428,136	368,506	
Silver „ „	365	168	—	197
Sheep and lambs' wool	49,647	197,502	147,855	—
Wine	233	35		198
Copper ore ..	28,620	20,709		7,911
Mohair ..	181,208	74,401		106,807
Total ..	319,703	720,951	516,361	115,113
		Net Increase £401,248		

AND FOR THE 10 MONTHS.

The imports of the six principal articles for the 10 months amounted to £3,932,543, as compared with £2,001,985 in the similar period of last year, exhibiting a net increase of £1,930,558, to which gold bullion and specie contributed to the extent of £1,125,557; wool to £736,151; mohair, £68,261; and copper ore, £3,836. On the other side, silver bullion and specie showed diminution to the extent of £1,554, and wine to £1,693.

Article.	10 Months, 1900.	10 Months, 1901.	Increase.	Decrease.
	£	£	£	£
llion and specie	299,439	1,424,996	1,125,557	—
Silver „ „	6,990	5,436	—	1,554
Sheep and lambs' wool	928,739	1,656,890	736,151	—
Wine	2,837	1,144	—	1,693
Copper ore	300,137	303,973	3,836	—
Mohair	468,843	537,104	68,261	—
Total	2,001,985	3,932,543	1,933,805	3,247
		Net Increase £1,930,558		

The October Shipments.

The total value of the exports to South Africa during October of the 32 principal articles of British and Irish manufacture amounted to £815,148, as compared with £636,491 for the same month of 1900, the net increase therefore being £178,657, or at the rate of 28·06 per cent. As we have above remarked, this total transcends anything above achieved in Anglo-South African trade, the nearest to it being the amount for March, 1897, viz., £755,395, which, however, is £59,753 less. The amount is also more than double that for October, 1899, the shipments in that month being valued at only £403,127. It is a remarkable and a satisfactory feature that this encouraging advance is due not to an abnormal increase in any one item, but the steady expansion affecting almost every class of goods enumerated. Six out of the 20 increases are of five figures, of which there were in iron and steel goods, viz., locomotives, exported to £32,487, against £1,652; unenumerated descriptions of engines. £28.799, or an increase of £20,971; and galvanised sheets, £45,138, as compared with £15,714. Other metal goods exhibiting enhancement were agricultural machinery (not engines), shipped to £5,757, in contrast with £2,095; cast and wrought iron, £50,818, an improvement of £5,728; iron and steel wire and manufactures, £7,876, the amount in October, 1900, being £4,733; cutlery, £9,175, against £7,909; and textile machinery, £60, or an increase of £11. All soft goods items showed advance, apparel and slops coming first with £230,051, an increment of £35,554, and haberdashery and millinery, £33,358, against £25,423. Of cotton piece goods, grey and unbleached exhibited an increase of £1,104; bleached, £817; printed, £6,213; and dyed, £9,172; while woollen and worsted tissues were in the ascendant by £3,690 and £7,969 respectively. The other increases were £11,582 in saddlery and harness; boots and shoes, £100,524, or a betterment of £25,830; and £3,437 in beer and ale. On the other side there was a decline of £15,718 in railroad iron and steel, and of £2,832 in bar and angle iron; while manufactures of steel or of steel combined with iron were exported to only £9,798, against £11,720 in the former period. As might be supposed, mining machinery suffered a further drop of £8,710, the shipments being valued at only £6,728. Agricultural engines exhibited a decline of £295; sowing machines one of £527; unenumerated hardware, £115; and unenumerated descriptions of machinery, £1,701. The other decreases were in paper and British and Irish spirits.

The Exports for the 10 Months.

The value of the 32 principal articles shipped from the United Kingdom to South Africa in the 10 months amounted to £6,363,267, as compared with £5,099,331 in the corresponding period of 1900, thus revealing a net increase of £1,263,936, equal to 24·7 per cent. Only four items showed decline, viz., cast and wrought iron, £65,761; mining machinery, £35,485; cement, £20,377; and bleached cotton piece goods, £5,296. Of the increases, the largest was in locomotives, which were shipped during the period in question to the value of £211,785, an improvement of £138,434. Agricultural engines were exported to £6,369. against £4,710; other engines, £103,710, an increment of £18,856; agricultural machinery (not engines), £20,837, in juxtaposition with £13,170; sewing machines, £24,024, an advance of £6,779; textile machinery, £16,507, compared with £11,063; and other machinery, £250,440, the amount in the 1900 period being £156,016 Cutlery was exported to £67,041, against £44,325; unenumerated hardware, £112.158, or a gain of £16,044; bar and angle iron, £68,159, the increase amounting to £6,408; railroad iron and steel, £223,603, as compared with £201,790; iron and steel wire and manufactures, £53,701, a betterment of £3,091; galvanised sheets, £295,810, contrasted with £279,139; and manufactures of steel or of steel combined with iron, £83,162, in comparison with £61,108. Of other classes of goods, apparel and slops showed an increase of £396,607; haberdashery and millinery, £40,807; cotton piece goods, £107,144; woollen and worsted tissues, £50,851; boots and shoes, £178,686; saddlery and harness, £51,356; beer and ale, £21,372; British and Irish spirits, £121,945; and paper, £13,407.

THE AGGREGATE TRADE FOR THE NINE MONTHS.

We are now able to publish the aggregate British imports of South African produce and exports to South Africa of manufactures of the United Kingdom during the first nine months, in comparison with the values for the similar periods of the two previous years.

THE AGGREGATE IMPORTS.

There was a considerable improvement in the value of the aggregate imports, the amount being £3,712,051, or an increase of £871,300, equal to 30·6 per cent. on the amount for the 1900 period. In comparison, however, with the nine months' totals of 1899, there was a decline of £439,404, or at the rate of 10·5 per cent. The trade of the Cape Colony showed an increase of £711,085, or 28·3 per cent. over the 1900 figures; and that of Natal of £195,460, or 73·4 per cent.; while the shares of Portuguese East Africa (Delagoa Bay, Beira, etc.) declined by £35,245, or 56·9 per cent.

Exports to	9 Months, 1899.	9 Months, 1900.	9 Months, 1901.
	£	£	£
Cape Colony	3,341,615	2,512,891	3,223,976
Natal	758,123	265,979	461,439
Portuguese Possessions	51,717	1,881	26,636
Total	4,151,455	2,840,751	3,712,051

THE AGGREGATE EXPORTS.

The aggregate British exports to South Africa for the first nine months of the year amounted to £12,080,720, as compared with £9,529,820 in the corresponding period of 1900, and £9,521,436 in that of 1899. This means increases of £2,550,900, or 26·7 per cent., and £2,559,284, or 12·6 per cent. respectively over the figures for the two former periods. The amount is higher than for any previous nine months in the export trade from this country to South Africa, the highest previously recorded being in 1897, when the total was £11,168,937, figures which the first three quarters of 1901 exceed by nearly one million sterling. The figures of both the Cape Colony and Natal show substantial increases over the previous periods, but in the case of goods entering South Africa through Portuguese East Coast ports a small decline is shown, and a considerable reduction on the 1899 figures. The respective shares in the trade were as follows:—The Cape Colony, 67·0 per cent., against 69·6 per cent. in 1900, and 65·1 per cent. in 1899; Natal, 28·7 per cent., against 24·1 per cent. in 1900, and 25·0 per cent. in 1899; and Portuguese Possessions, 4·3 per cent., against 6·3 per cent. in 1900, and 9·9 per cent. in 1899.

GOVERNMENT NOTICES.

Game Seasons, 1902.

In view of the near approach of the Shooting Season, the following schedules showing the General and Special Close Seasons for Game in the respective Districts of the Colony at the present date are published for the information and guidance of all concerned.

Agricultural Department, Cape Town, 7th January, 1902.

GENERAL CLOSE OR FENCE SEASON.

Close or Fence Season.	Division.			
I. FROM 16TH JUNE to 31ST JANUARY	Bredasdorp Caledon Cape Clanwilliam Ladismith	Malmesbury Mossel Bay Namaqualand Oudtshoorn Paarl	Piquetberg Riversdale Robertson Stellenbosch Swellendam	Tulbagh Van Rhyn dorp Worcester
II. FROM 1ST AUGUST to LAST DAY OF FEBRUARY	Aberdeen Albert Beaufort West Britstown Calvinia Carnarvon Ceres	Colesberg Fraserburg George Graaff-Reinet Hanover Hope Town Humansdorp	Jansenville Kenhardt Knysna Middelburg Murraysburg Philipstown Prieska	Prince Albert Richmond Steynsburg Sutherland Uniondale Victoria West Willowmore
III. FROM 1ST SEPTEMBER to LAST DAY OF FEBRUARY	Albany Alexandria Aliwal North Barkly East Bathurst Bedford	Cathcart Cradock East London Fort Beaufort Glen Grey Herschel	King William's Town Komgha Peddie Port Elizabeth Queenstown Somerset East	Stockenstrom Stutterheim Tarka Uitenhage Victoria East Wodehouse
IV. FROM 16TH AUGUST to 31ST MARCH	Barkly West Hay	Herbert Kimberley	Gordonia Mafeking	Vryburg
V. FROM 1ST SEPTEMBER to 15TH APRIL	Griqualand East, Territory of	Transkei, including Gcalekaland	Tembuland, including Emigrant Tembuland and Bomvanaland	Port St. John's

SPECIAL CLOSE SEASONS.

NOTE.—In certain Divisions it has been found desirable to have a Special Close Season for various animals and birds, and to include certain birds under the provisions of the Game Acts.

Description of Game.	Division.	Special Close Season.
Grysbok	Cape—Constantia Area	1st December to 30th June
	Swellendam	1st January to 30th June
Gemsbok	Namaqualand	1st December to 31st May
Rhebok *Steenbok* *Duiker* *Hares*	Prieska	1st August to 31st January
Springbuck	Herbert	1st September to 31st January
	Philipstown	1st December to 31st January
Dikkop	Humansdorp	1st August to 31st January
	Port Elizabeth and Uitenhage	1st September to End of February
Guinea Fowl	Aberdeen	1st October to 31st March
	Graaff-Reinet	1st October to 31st January
Namaqua Partridge or Sand Grouse	Carnarvon	1st December to 31st May
	Fraserburg	1st February to 31st July
	Namaqualand	1st May to 31st October
Partridge	Albany	1st August to End of February
	Cathcart	1st August to 31st March
	Elliot (Tembuland)	1st September to End of February
	Humansdorp	1st July to 31st January
	Port Elizabeth	1st July to End of February
	Uitenhage	1st July to 30th April
Paauw	Calvinia, Ceres, Clanwilliam, Malmesbury, Piquetberg, Queenstown, Van Rhynsdorp, Worcester	1st December to 30th June
	Carnarvon, Namaqualand	1st December to 31st May
	Fraserburg	1st February to 31st July
	George, Humansdorp	1st August to 31st January
	Port Elizabeth	1st September to End of February
Pheasant	Albany	1st August to End of February
Quail	Cape	16th June to 31st January
Knorhaan	Uitenhage	1st September to End of February
Wild Duck	Caledon	1st December to 31st January
	George	1st August to End of February
	Gordonia	16th August to 31st March
	Port Elizabeth and Uitenhag	1st September to 31st December
	Elliot (Tembuland)	1st September to 15th April
Wild Goose	Caledon	1st December to 31st January
	George	1st August to End of February
	Gordonia	16th August to 31st March
	Elliot (Tembuland)	1st September to 15th April
Coot	Caledon	1st December to 31st January
	George	1st August to End of February
Snipe	Elliot (Tembuland)	1st September to 15th April

SPECIAL CLOSE SEASONS—*Continued.*

Description of Game.	Division.	Special Close Season.
Wild Ostriches	Beaufort West, Calvinia	1st June to the 360th day after
	Barkly West, Hay, Herbert, Hope Town, Kimberley	1st June to 30th May
	Namaqualand	1st June to 31st January
	Kenhardt	1st April to 31st October
	Vryburg	1st September to End of February
	Britstown, Carnarvon	1st August to End of February; but these birds are now specially protected in Britstown Division up to 17th November, 1902, and in Carnarvon Division up to End of February, 1902.

NOTE.—To kill Wild Ostriches a Licence fee of £20 for the season must be taken out through the Resident Magistrate of the Division in which the birds are to be hunted. Further, an export duty of £100 is levied on each Ostrich (wild or tame) exported to other countries, and £5 on every Egg; except to any State or Country that imposes a duty of not less than these respective amounts.

"ROYAL" OR BIG GAME.

A Special Permit to shoot any of the varieties of Big Game mentioned hereunder must be obtained from the Government in addition to the Ordinary Game Licence. Application should be made to the Under Secretary for Agriculture through the Resident Magistrate of the Division in which the Game is to be hunted.

Description of Game	Where found; and General or Special Close Season.
Elephant	Alexandria, Uitenhage, 1st September to End of February. George, Knysna, 1st August to End of February. NOTE.—As Elephants only exist in limited numbers in these Divisions, special permits are only granted in very exceptional cases. Landed proprietors, or persons authorized by them, are, however, entitled to kill Elephants on their own property.
Eland	Only a few domesticated Elands are to be found in the Colony—at Groot Schuur, Rondebosch, and in Graaff-Reinet Division. No permits are granted to shoot these animals.
Hippopotamus	Not to be found now in the Colony.
Zebra	Cradock, Somerset East, 1st September to End of February. George, Prince Albert, Uniondale, 1st August to do. Oudtshoorn, 16th June to 31st January. Only a few troops of Zebras exist in these Divisions, and their destruction is consequently prohibited.
Buffalo	Albany, specially protected up to and including 8th December, 1901. Alexandria, do. do. do. 26th July, 1901. Bathurst, do. do. do. 5th May, 1904. Uitenhage, Close Season, 1st September to End of February.

"ROYAL" OR BIG GAME—*Continued.*

Description of Game.	Where found; and General or Special Close Season.
Bontebok	Bredasdorp, Swellendam, 16th June to 31st January.
Blesbok	Prieska, Steynsburg, 1st August to End of February. Gordonia, 16th August to 31st March.
Gemsbok	Calvinia, Kenhardt, Prieska, 1st August to End of February. Barkly West, Gordonia, Mafeking, Vryburg, 16th August to 31st March.
Gnu or Wildebeest	Gordonia, Mafeking, Vryburg, 16th August to 31st March. Hope Town, Kenhardt, 1st August to End of February.
Hartebeest	Barkly West, Gordonia, Hay, Herbert, Kimberley, Mafeking, Vryburg } 16th August to 31st March Ladismith, Namaqualand, Riversdale, 16th June to 31st January
Koodoo	Hope Town, Jansenville, Prieska, Prince Albert, Willowmore } 1st August to End of February. Barkly West, Gordonia, Hay, Herbert, Mafeking, Vryburg } 16th August to 31st March. Kimberley, 16th August to 31st March.
Rietbok	Komgha, specially protected up to and including 5th May, 1904. East Griqualand, specially protected up to and including 28th May, 1902, and General Close Season, 1st September to 15th April.

GAME SPECIALLY PROTECTED FOR CERTAIN PERIODS.

Description of Game.	Division in which it is protected, and for what period.		
All kinds of Game	Albany—Municipal Commonage	Up to and including	17 Nov., 1902
	Aliwal North—Do.	Do.	20 Aug., 1902
	Cradock— Do.	Do.	28 May, 1902
	East Griqualand—All Commonages ..	Do.	28 May, 1902
	Malmesbury—Field Cornetcies of Mossel Bank River and Paardenberg ..	Do.	8 Feb., 1904
	Mossel Bay—Municipal Commonage	Do.	31 Mar., 1902
	Paarl—(Paauw excepted)	Do.	26 Nov., 1902
	Port St. John's ..	Do.	25 June, 1902
	Somerset East Commonage	Do.	11 April, 1903
	Wodehouse—Dordrecht Commonage ..	Do.	23 Sep., 1903
	Tembuland { Cala Commonage	Do.	8 April, 1904
	Tembuland { Engcobo do.	Do.	15 Feb., 1904
	Tembuland { St. Mark's District	Do.	31 Aug., 1904
	Transkei—Butterworth Commonage, &c., and Ibeka Reserve ..	Do.	14 July, 1904
All kinds of Antelope	Barkly East ..	Do.	4 June, 1902
	Elliot (Tembuland) ..	Do.	18 July, 1902
Buffalo ..	Albany ..	Do.	8 Dec., 1904
	Alexandria ..	Do.	26 July, 1904
	Bathurst ..	Do.	5 May, 1904

GAME SPECIALLY PROTECTED FOR CERTAIN PERIODS—*Continued.*

Description of Game.	Division in which it is protected, and for what period.		
Bushbuck Ewes	Albany	Up to and including	28 Dec., 1903
	East London ..	Do.	12 Nov., 1902
	East Griqualand ..	Do.	28 May, 1902
	King William's Town ..	Do.	21 Jan., 1903
	Peddie ..	Do.	31 Mar., 1903
	Victoria East ..	Do.	2 Feb., 1903
Duiker ..	George ..	Do.	27 Sep., 1902
Grysbok ...	Uitenhage ..	Do.	2 Feb., 1903
Klipspringer ..	East Griqualand ..	Do.	28 May, 1902
Oribe ..	Albany ..	Do.	28 Dec., 1903
	Bathurst ..	Do.	22 Mar., 1904
	East Griqualand ..	Do.	28 May, 1902
	Port Elizabeth ..	Do.	27 Sep., 1902
Rhebok—Rooi- & Vaal-	Albany ..	Do.	28 Dec., 1903
	Aliwal North ..	Do.	20 Aug., 1902
	Caledon ..	Do.	1 Feb., 1902
	East Griqualand ..	Do.	27 Sep., 1902
	George ..	Do.	28 May, 1902
Rietbok	Komgha ..	Do.	5 May, 1904
Springbuck	Uniondale ..	Do.	21 Sep., 1903
Steenbok ..	Aliwal North ..	Do.	20 Aug., 1902
	Caledon ..	Do.	1 Feb., 1902
	Carnarvon ..	Do.	End of Feb., 1902
Ant-Bear or *Aard Vark*	Britstown ..	Do.	17 Nov., 1902
Dikkop	East London ..	Do.	14 July, 1904
Partridges	Albany—Salem Commonage	Do.	3 May, 1902
Paauw	East London ..	Do.	14 July, 1904
Pheasants	Albany—Salem Commonage	Do.	3 May, 1902
Plovers ..	East London ..	Do.	14 July, 1904
	Kimberley ..	Do.	18 Nov., 1903
Wild Ostriches	Britstown,	up to and including	17th November, 1902.
	Carnarvon,	Do.	End of February, 1902.
Secretary Bird	East London	Do.	14th July, 1904.
	Fraserburg,	Do.	14th October, 1904.
	Uitenhage,	Do.	26th August, 1904.
	Van Rhynsdorp,	Do.	27th September, 1902.
Great and Small Locust Birds	Over the whole Colcny, including the Native Territories	up to and including 10th March, 1902.	
Wattled Starling or Kaalkop Spreeuw	Over the whole Colony, excluding the Native Territories	up to and including 11th August, 1904.	
Red-shouldered Glossy Starling or Green Spreeuw	King William's Town,	up to and including	27th October, 1904
Owls and Hawks ..	Fraserburg,	Do.	14th October, 1904.
Blaauw Valk ..	Van Rhynsdorp,	Do.	27th September, 1902.
Stanley or Blue Crane	Fraserburg,	Do.	14th October, 1904.
Hornbill or Toucan ..	Bathurst,	Do.	10th September, 1902.
Various Small Birds	Cape	Do.	26th July, 1904.
	East London	Do.	14th July, 1904.
	Mossel Bay, Municipal Commonage,	Do.	31st March, 1902.
	Uitenhage,	Do.	26th August, 1904.
Cranes, Fish Eagles, Ospreys, Curlews, Terns and other Birds on Kowie River	Bathurst,	Do.	19th July, 1903.

BIRDS AND OTHER ANIMALS EXEMPTED FROM THE OPERATION OF THE GAME ACTS

Description.	Division in which exempt and up to what date.		
Duiker Antelope	Bathurst,	up to and including	27th January, 1904.
	Komgha,	do	22nd November, 1901.
Hares	Bathurst,	do.	27th January, 1904.
	Ceres,	do.	22nd March, 1902.
	George,	do	21st December. 1903.
	Oudtshoorn,	do.	31st January, 1904.
	Riversdale,	do.	22nd September, 1904.
	Robertson,	do.	17th November, 1902.
	Steynsburg,	do.	2nd October, 1902.
	Swellendam,	do.	31st December, 1904.
	Tarka,	do.	5th February, 1902.
Namaqua Partridge	Victoria West,	do.	22nd November, 1904.
Paauw	Paarl,	do.	22nd November, 1904.

FOREST RESERVES.

Permits are issued to a limited extent for Shooting in the Crown Forests information as to conditions of Permit and Scale of Charges may be obtained on application to the Conservators at Cape Town, King William's Town and Knysna.

Farmers' Apprentices. Dairy Assistants, &c.

As inquiries are from time to time received from young men from abroad as to where they may serve apprenticeship or gain practical experience of farming in this Colony, before starting on their own account, the Secretary for Agriculture invites Farmers who are willing to receive young men of good character, for this purpose, to register their names with the Under Secretary for Agriculture, stating the class of farming they do, how many young men they are prepared to take, and for what period they would enter into an agreement.

It is not probable that these young men will be in a position to give more than their free services in return for the experience they will gain; that is, they will not be able to pay any fee; and they will look to receiving free board and lodging in return for their services.

It is to Farmers, therefore, who are willing to grant such young men free board and lodging in return for services rendered, that this application is especially addressed.

With reference to the above notice to Farmers, the Secretary for Agriculture now invites young men who are willing to engage themselves as Farmers' Apprentices in Cape Colony to register their names with the Under Secretary for Agriculture, Cape Town. The apprentice will gain experience in farming in South Africa, and have an opportunity for spying out the land before starting on his own farm. To the new comer from another country this is essential, for he has much to learn and unlearn.

Many applications for such Apprentices have been received from Farmers in the Colony. It will be noted that the Apprentice will neither receive wages, nor pay a fee. He will get free board and lodging in return for his services, and at the same time acquire the experience he is in need of.

Applications for employment have also been received from several Lady Dairy Experts and Dairy Assistants; and Dairy Farmers and others desiring to avail themselves of the services of such are invited to register their names with this Department, giving particulars as to situation and extent of operations, etc., and salary and other emoluments they are prepared to offer.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM BASUTOLAND.

By command of His Excellency the Governor, the following Proclamation No. 164, 1901, was published in the Government Gazette of October 29th, 1901:—

Whereas by Proclamation No. 100, bearing date the 4th day of June, 1901, I did, by reason of the existence of the disease amongst cattle known as Rinderpest in the Territory of Basutoland, prohibit the introduction of horned cattle from the said Territory into this Colony:

And whereas the said disease has spread to the portions of this Colony which adjoin the said Territory, thus rendering it unnecessary to longer maintain the prohibition imposed by the said Proclamation:

Now, therefore, under and by virtue of the powers and authorities in me vested, I do hereby proclaim, declare and make known that from and after the date hereof the prohibition upon the introduction of horned cattle from Basutoland into this Colony shall be removed: the said Proclamation No. 100 of 1901 being hereby repealed accordingly.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM ORANGE RIVER COLON AND THE TRANSVAAL.

By command of His Excellency the Governor, the following Proclamation No. 139 1901, was published in the Government Gazette of August 16th, 1901:—

Under and by virtue of the powers vested in me by the "Animal Diseases Act," No. 27 of 1893, and by the "Animals Diseases Rinderpest Amendment Act," No. 2 of 1897, I do hereby proclaim, declare and make known that it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced into any part of this Colony from the Orange River Colony and the Transvaal, save and except such cattle as may be required to be introduced by the Government for the purpose of supplying Bile or Serum for inoculation against Rinderpest:

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed

And I do hereby further declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

Proclamation No. 217, bearing date the 29th day of October, 1900, together with the regulations issued thereunder, is thereby repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined Regulation for checking the spread of the infection is republished.

REGULATION ISSUED UNDER PROCLAMATION No. 30, DATED 20TH JANUARY, 1899.

Whenever under the provisions of Sections 11 and 12 of Act No. 27 of 1898, any area is declared or proclaimed to be an area infected with Rinderpest, it shall not be lawful for any person, animal, animal produce, article or thing, who or which may, in the opinion of the Magistrate of the District in which such area is situated, be liable to convey infection of Rinderpest, to leave or to be removed therefrom.

Inoculation Against Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of the Colony, it is desirable to inform stock-owners of the intentions of the Government as to dealing with the outbreak should it unfortunately become general in the Colony, and to advise stock-owners as to the best course to follow.

The Government propose that, as a general rule, cattle-owners themselves should perform the inoculation. Glycerinated Bile will be used, though circumstances may arise where it will be preferable to use Serum.

Bile Stations will be established in suitable places as necessity arises in localities where farmers have agreed to contribute the required proportion, say 5 per cent., of their cattle for production of the bile. It must be clearly understood that unless farmers are prepared to thus contribute the necessary cattle, it will be impossible for them to have the benefit of a Bile Station.

Glycerinated Bile will be issued free to contributors in proportion to the number of cattle contributed to a Bile Station. To non-contributors a fair charge will be made for bile if any be available for issue.

Serum will be charged for at the rate of £1 per bottle of ten doses.

A limited supply of Glycerinated Bile to meet emergencies will, for a time, be available, free of charge, from the Bile Station which has been established under arrangements with the Imperial Military authorities near Aliwal North.

As occasion requires, Demonstrators will be sent to instruct farmors in the method of inoculation, free of charge. They will, as a rule, inoculate only enough cattle to show how it is to be done, leaving the owner to continue the work. The Government will supply syringes on application to the Resident Magistrate, or to the Demonstrators at the following charges :- -20 cc. capacity, 20s ; 10 cc. capacity, 15s. This payment may be recovered on return of the syringe to the Magistrate, in good order.

After the experience gained during the outbreak of 1896-1898, the Colonial Veterinary Surgeon wrote* as follows :—

"The method of inoculation which I would recommend in future sporadic outbreaks of the disease is briefly as follows : —

"*Infected Herds.*—These should be inoculated at once with either serum or glycerinated bile ; every animal which indicates infection by a rise of temperature should receive a large dose of not less than 100 cc. of serum, or 80 cc. of glycerinated bile ; the latter should, by preference, be injected into the jugular vein, so as to secure its immediate action. Then from eight to twelve days after, all the animals in the herd which give no indication of being infected with the disease, or fever temperature, should receive an injection of pure bile ; not less than 10 cc., and for large animals 20 cc. This will confer a lasting immunity sufficient for all practical purposes.

"*Clean Herds.*—When it is decided to inoculate a clean herd, which is in danger of becoming infected through its proximity to diseased cattle I would recommend that the animals composing the herd should be inoculated first with 20 cc. of glycerinated bile, and to follow this inoculation in from eight to twelve days with an injection of from 10 to 20 cc. of pure bile. This will confer a strong and lasting immunity on the animals in the herd, and will be free from risk arising from the inoculation or of introducing the disease.

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* See *Agricultural Journal*, June 5, 1899, in which will be found a full consideration of the different methods of inoculation.

"*Use of Pure Bile.*—Pure fresh bile should not be used in an infected herd, if any of the other inoculating materials can be obtained, as it tends to intensify the character of the disease in those already infected, and its immunising effect is too slowly developed to protect the healthy cattle against infection, if they are left in contact with those already sick. If no other means are available, however, the temperatures of the whole of the cattle in the infected herd should be carefully taken by the clinical thermometer, and only those which register a normal temperature should be inoculated with pure bile, the others should be separated from the inoculated lot at once, and carefully tended. If glycerine can be obtained, the spare bile should be mixed with it in the proper proportions—one part of glycerine to two parts of bile. This mixture, after standing forty-eight hours, may be injected into the affected animals in large doses, not only with safety, but with marked benefit.

"*Preparing the Bile.*—The bile should be taken from an affected animal immediately after death, or from one which is killed in the last stage of collapse.

"Biles of all shades of colour—except those which are red from the presence of blood—may be used, so long as they are clear and free from a putrid smell. Thin light yellow biles should also be rejected.

"All the galls extracted at one time should be mixed together, after standing separately for twelve to eighteen hours, so as to render them uniform in strength and immunising properties. Pure bile should be used on the second day after being drawn, unless it is kept in an ice chest, when it may be kept sweet much longer. But if pure bile is used as a second inoculation only, as above directed, it is not desirable to keep it longer than twenty-four hours.

"Glycerinated bile is made by adding one part of glycerine to two parts of bile, stir the mixture well, then mix all the biles taken at one time, and allow them to stand for eight days. But if there is urgency, the glycerinated bile may be used forty-eight hours after it is mixed.

"I would strongly recommend that in every outbreak of the disease that occurs, every drop of suitable bile, obtained from the animals which die, should be mixed with glycerine in proper proportions, two parts of the bile to one of glycerine, so that it may be preserved and made available for the inoculation of infected herds, and also for the first inoculation of clean herds which may be considered in danger. Pure bile for the second inoculation of clean herds can always be obtained when the disease appears in any locality, which would be the only reason for inoculating clean herds in the immediate vicinity."

Taking the Bile.—To remove the bile the animal must be laid on its left side, the skin and flesh on the right side immediately behind the last rib being cut through; the ribs being raised, the gall bladder will become visible. The gall bladder should be then punctured with a small knife and the gall allowed to escape into a wide-mouthed bottle. If wide-mouthed bottles are not available then ordinary whisky bottles may be used with an *enamelled* funnel, which can be procured at any country store. Every precaution must be taken that the operation is performed in a thoroughly clean manner, the hands of the operator and all knives, &c., being thoroughly cleansed before use.

Inoculating.—After having secured the animal to be operated upon, the necessary dose of bile is injected under the skin of the dewlap by means of a Hypodermic Syringe, care being taken that the point of the needle is not inserted into the flesh, but between the skin and flesh.

Symptoms of Rinderpest.

The Outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined description of the symptoms of Rinderpest is hereby published:—

The early symptoms of Rinderpest are a rise of internal temperature to 106 or 107° Fahr.; the animal stands with its head hanging down, ears drawn back and coat staring; it refuses all food and occasionally shivers. A mucous discharge flows from the eyes and nostrils; the extremities are cold, and the breathing is laboured and frequently accompanied with moaning. The inner part of the upper lip and roof of the mouth and all visible mucous membranes are reddened, and covered with an eruption of minute pimples, and later with a branlike exudation. The bowels are occasionally constipated, but in most cases diarrhœa sets in, the evacuations being slimy and very frequently of a dirty yellow colour. The prostration of strength is great, the animal staggering when made to move. In milch cows the secretion of milk is rapidly diminished, and soon ceases altogether. The disease usually ends fatally in from six to ten days.

It is generally believed that the infection is produced through the respiratory organs; from there the contagion becomes generalised. The contagion exists in the secretions and excretions, urine, saliva, mucous secretions of the nose, mouth and eyes, in the sweat, expired air, blood, and in all the tissues. It may be conveyed directly by the diseased animals, or indirectly by the dung, the bedding, the earth, hides, wool, meat, clothing, wagons or vessels, by people, dogs, sheep and chickens, &c. Contagion takes place only through short distances. When the weather is dry this is reduced to its minimum (about 27 yards), and the progress of the disease may be stopped by a ditch separating the diseased from the healthy animals.

In order to detect the earliest symptoms of Rinderpest, owners of horned cattle are warned of the urgent necessity for keeping a constant and close watch upon their stock. Any suspicious cases should be immediately reported to the nearest Resident Magistrate, Field-cornet or Police Officer, and the sick animal kept separate till an inspection is made.* Stock should be carefully examined daily by a responsible person, more particularly for any symptoms resembling those above described.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October, 1900:—

Whereas by virtue of the provisions of the Act No. 27 of 1898, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1898, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal

North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B' hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz :—

Number and general description of Cattle ....
....
....
Owner's name and address ....
....
In charge of..
Place to which Cattle are being sent..............................
(**Signature**)..
(**Address**)..
Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature.......................................
(Address)...

Date......................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz. :—

Number and general description of Cattle } ....
Owner's name and address } ....
In charge of...
Place to which Cattle are being sent......................

(Inspector's signature).......................................
(Address)...

Date....................

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900 :—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be follows :—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*)	5	0
For a Maanhaar Jackal (*Proteles cristatus*) ..	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Seed Wheat.

A small consignment of "Red Egyptian" Seed Wheat has been imported by the Government for experimental sowing with a view to ascertaining its suitability as a rust-resistant wheat as well as its milling qualities.

This wheat will be distributed in lots not exceeding 100 lb. to any one person, upon deposit of a sum at the rate of 10s. per 100 lb., and the amount so paid will be refunded to all those applicants who furnish a full report, upon a printed form which will be supplied to them, showing the result of the trial.

Applications should be addressed to the Under Secretary for Agriculture, Cape Town, and must be accompanied by a remittance (by P.O. Order, Postal Note, Bank Draft or Cash) for the amount of the deposit.

As the consignment is a small one, early application should be made.

Tobacco Seed.

A small consignment of the following varieties of Tobacco Seed, viz. :—White Burley Havana, Yellow Oronoko, Virginia "One Sucker," Virginia Pryor, Blue Pryor, Connecticut Seed Leaf, and Maryland. have been obtained from America by the Agricultural Department. Sumatra, Long Leaf Gooch and St. Felix are shortly expected.

Applications, accompanied by the deposit of 5s., should be addressed to the Under Secretary for Agriculture, Cape Town ; and will be dealt with in order of receipt.

The seed will be distributed in lots not exceeding 3 oz. each of any three of the above-mentioned varieties upon deposit of the sum of 5s. by each applicant, which amount will be refunded by the Government to all applicants who furnish a report in due course, giving full particulars as to the mode of cultivation adopted and the results obtained.

LONDON WOOL SALES.

Sales and Prices of Cape Wools.

Continued from page 150.

The sixth series for the year 1901 began on November 26th, and the following is from Messrs. Stables, Straker & Co's Wool Circular and Report.

The following abbreviations are used to designate the different conditions and clips of wool:—Grs. stands for grease wool; Flc., fleece-washed; Scd., scoured; com., combing wool; Cl., clothing; Lam., lambs'; Dam., damaged; Hgt., bogget; Blk., black; Sn.-wt., snow-white; Xbd., cross-bred; Lks., locks; Bel., bellies; Pcs, pieces. Slip, wool off skins.

Not having the necessary woodcuts we give the various bale marks, such marks are described in letterpress, thus Double triangle, crossed arrows, &c.

Mark.	Description & Ship.	Bales.	s.	d.
ALGOA BAY.		Dec. 10.		
	Gaul.			
◇ BS	sup.sn-wt.ext. ..	3	1	1
	„ „ „ ..	11	not	sold
	„ „ „ ..	5	0	11
	„ „ ..	1	0	9
BS	„ „ ext. ..	8	1	0½
	„ „ „ ..	8	0	11½
	„ „ ..	1	0	10½
CAPE.		Dec. 11.		
	P			
FS/MtDare XBI	Grs.lam.Gape	1	0	3¾
	„ pcs. „ ..	1	0	3½
	Gaul.			
DD	Scd.sup.sn-wt.ext.	4	1	1½
	„ „ „ ..	12	0	11½
	„ „ „ ..	4	1	0
	„ „ „ ..	14	0	11¼
	„ „ „ ..	28	0	11
	„ „ „ ..	10	0	10½
	„ „ „ ..	7	0	10

Mark.	Description & Ship.	Bales.	s.	d.
	Carisbrook.			
Caledon CJM/FL (New Clip)	Grs.sup.com. ..	22	0	7¼
	„ „ „ ..	22	0	7
	„ „ „ ..	14	0	6¾
Paarl/M	...sn-wt.ext.sup..	6	not	sold
ALGOA BAY.				
	Kinfauns.			
AC	...Grs.com. ..	9	0	4¾
<S>	...Scd. ..	2	0	10½
EAST LONDON.				
	Scot, Briton, Galeka.			
Zulu	...sup.sn-wt. ..	54	1	0
CB	...Grs.com. ..	11	0	5
Toise	...sn.wt.sup. ..	11	0	11½
(B)	... „ ..	6	0	11½
B/L&P	„ ..	6	0	11½
	„ ..	2	0	9½
FBT/HebeHebe	Flc.wsh.sup. ..	16	0	7

Mark.	Description & Ship.	Bales.	s.	d.
JH	Grs.sup. ..	9	0	7
	,, ,, lam. ..	5	0	7
GHB	,, ,, com. ..	10	0	6
	,, ,, lam. ..	11	0	6
B C M in revrs'd triangle	,, ..	10	0	5¾
B D ,,	,, ..	10	0	5½

CAPE. Dec. 12.

Hubbuck, Dunottar, Dunvegan.

W JAE	Grs.sup. ..	11	0	5
	,, ,, ..	10	0	5½
	,, ,, ..	17	0	4½
	,, ..	6	0	4½
	,, com. ..	3	0	4
	,, C C ..	1	0	2½
<SJ>	,, ..	20	0	4¾
	,, C C ..	1	0	2¼
KO	...Scd. ..	1	0	11½
AF	...sup.sn-wt. ..	25not sold		

EAST LONDON.

Norman, Scot, Norham.

Crossed Arrows	Scd.sup. S W	52	1	1
	,, ,, ,, ,,	56not sold		
	,, ,, ,, ,,	9	1	1
Baza	Scd.sup. ..	66	1	0½
	,, ,, ..	27	1	0½
FWS ,,	... ,, ,, ..	32	1	0½
Lunda	,, ,, ..	2	0	11½
	,, ,, ..	3not sold		

Guelph, Raglan, Dunolly, &c,

M/PW	...Grs.com.sup. ..	10	0	6½
,, BDB	,, ,, ..	8	0	4¾
	wsh.mix. ..	1	0	6
,, FJM	Grs.sup.com. ..	16	0	6¼
	,, ,, ,, dam.	4	0	5¼
,, PW	... ,, ,, ,, ..	30	0	6¼
,, BDB	... ,, ,, ,, ..	13	0	5½

Galician.

MB/T	Grs.com. ..	9	0	5¼
	,, sup.light ..	5	0	5½
,, Q	... ,, com. ..	16	0	5

Mark.	Description & Ship.	Bales.	s.	d.

CAPE. Dec. 13.

Braemar, Galician, Dunolly,

MLW	...Grs.sup.com. ..	16	0	7
TUR	... ,, ,, ..	20	0	4½
SL	...sn-wt. ..	3	0	9½

ALGOA BAY.

Carisbrook, Briton,

JWS	sup.sn-wt. ..	5	1	0½
	,, ,, ..	3	0	10½
AWA	... ,, ,, ..	18	1	0
BLB	... ,, ,, ..	13	1	0
JSS	,, ,, ..	11	0	11½
	,, ,, ..	1	0	10
DUN	... ,, ,, ext. ..	15not sold		

EAST LONDON.

Galician.

SEG	...Grs.sup. ..	21	0	5½
GCL	,, ,, com. ..	30	0	6¼
	,, ,, ,, ..	4	0	6¼
	,, ,, lam. ..	4	0	5¾

CAPE Dec. 14.

Saxon.

P	Scd. ..	1	0	8
	,, ..	4	0	6¾
	,, C C ..	1	0	2
Various	..	4 sundry		

Fort Salisbury.

NW	Grs.dam. ..	14	0	3½
	,, ,, ..	10	0	3¾
	,, ,, ..	12	0	3¾
	,, ,, ..	12	0	3¼

EAST LONDON.

Norham, Dunvegan.

Crossed Arrows	Scd.sup. ..	45	1	1
	,, ,, ..	65	1	0½
Baza	... ,, ,, ..	25not sold		
WBS/Baza	... ,, ,, ..	22	1	0¼
FWS ,,	... ,, ,, ..	6	1	0
Lunda	,, ,, ..	12	0	10½
	,, ,, ..	2not sold		

Scot, Goorkha, Carisbrook, &c.

Mark.	Description & Ship.	Bales.	s.	d.
<✱>	...sup. F W ..	7	not sold	
Crossed Arrows	,, ,, ,, ..	34	not sold	
(PB) HYS	Grs.sup.com.hgt.	17	0	6¼
	,, ,, ,, ..	20	not sold	
	,, ,, ,, ..	15	0	5¾
	,, ,, ,, ..	1	0	5¼
SOU	,, ,, ..	4	not sold	
	,, ,, com.lam.	7	0	6
[LG]	... ,, ,, light ..	10	not sold	
MF	,, ,, ,, ..	11	0	4
	,, ,, com.long..	4	0	4½

CAPE.

Norham, Dunvegan.

Mark.	Description & Ship.	Bales.	s.	d.
WHJ 1901	...Grs.sup.com...	12	0	6¾
AS/LB ,,	Flc.wsh.sup.com	17	0	11
	,, ,, pcs ..	1	0	5¾
,, HB/W ,,	,, ,, sup.com.	30	0	11
	,, ,, pcs. ..	3	0	6¾
,, FN/W ,, ...	,, ,, sup.com.	9	0	10
,, ,, G ,, ...	Grs.sup.com. ..	9	0	7¼
,, KK/G ,, ...	,, ,, ,, ..	9	0	7¼
,, ADG ,, ...	,, ,, ,, ..	6	0	7¾
HBC C. Adams Junr Springfield	Grs.sup com. ..	20	0	6½

EAST LONDON.

Galician, Dunvegan,

Mark.	Description & Ship.	Bales.	s.	d.
EL Crossed Swords	sup.sn-wt. ..	38	not sold	
	,, ,, ..	23	1	0
	Scd.coarse ..	7	0	9
	,, sup.blk. ..	12	1	2
	,, grey ..	34	0	9½
	,, ,, ..	44	not sold	

Norham, Dunottar,

Mark.	Description & Ship.	Bales.	s.	d.
Zulu	...sup.sn-wt. ..	25	0	11½
<B>	... ,, ,, ..	9	0	11

Saxon, Galeka.

Mark.	Description & Ship.	Bales.	s.	d.
Toise	sup.sn-wt. ..	12	1	0
	,, ,, ..	10	0	11½
(B)	,, ,, ..	16	0	11
	,, ,, ..	5	0	10½
FBT	Flc.wsh.sup. ..	15	0	6¾
HebeHebe	mix. ..	2	0	4½

Guelph, Raglan,

Mark.	Description & Ship.	Bales.	s.	d.
ACMcD	Grs.sup.com. ..	9	0	6¾
	,, ,, ,, ..	13	not sold	
	,, ,, lam. ..	24	0	6¼
HTT	,, ,, ..	8	0	4¾
	,, lam. ..	5	0	4¾
S/FW/Toise	. sup.sn-wt. ..	23	0	11½

7, Butler Street, Cripplegate,
London, E.C., Dec. 14th, 1901.

The sixth series of Colonial Wool Sales for the current year commenced on the 26th ult. and closed this day. The Brokers' priced catalogues were enfaced as ollows:—

	BALES.
Sydney	42,397
Queensland	34,031
Victoria	27,060
Adelaide	5,535
Tasmania	1,681
West Australia	5,888
New Zealand	67,328
Cape and Natal	11,481
Total	194,836 Bales.

Purchases for export are estimated at about 90,000 bales, whilst "held-over" and "bought-in" parcels are computed at somewhere about 42,000 bales, for realization in the ensuing series to commence here on the 21st Jan., 1902.

STABLES, STRAKER & CO.

RAINFALL, NOVEMBER, 1901.

Note: n.r. denotes that, up to the date of publication, Returns have *not* been *received* from those Stations.

I. CAPE PENINSULA:	INCHES.
Royal Observatory—12 inch gauge	2·24
Cape Town, Town House	
Do. South African College	3·88
Do Sea Point (Hall)	2·69
Do. do. (Roseby)	
Do Molteno Reservoir	4·13
Do Platteklip	5·15
Do Signal Hill	3·30
Table Mountain, Disa Head	n.r.
Do Kasteel's Poort	4.37
Do Waai Kopje	5·80
Do St. Michael's	5 80
Devil's Peak, Block House	5·65
Do. Nursery Gauge	4·54
Do. Lower Gauge	3·41
Rondebosch	3 19
Newlands (Montebello)	n.r.
Bishopscourt	4·54
Claremont (Sanatorium)	2·45
Kenilworth	2·87
Wynberg (St. Mary's)	2·78
Groot Constantia	2·62
Tokai	2·73
Simon's Town (Wood)	2·53
Do. (Gaol)	2·34
Blaauwberg Strand	1·58
Robben Island	1·72
Strandfontein	1·59
Camp's Bay	2·95
Fish Hoek	2 23
Cape Point	1·23
Smith's Farm	1·71
Durbanville	n.r.

II. SOUTH-WEST:	
Eerste River	n.r.
Klapmuts	2 36
Stellenbosch (Gaol)	3·37
Somerset West	1·80
Paarl	3·12
Wellington (Gaol)	1·84
Do. (Huguenot Seminary)	1·78
Weltevreden	2 58
Tulbagh	1·91
Kluitjes Kraal	2·08
Ceres	2·74
Rocklands	2·50
Caledon	2·59
Do. (Gordon)	
Worcester (Gaol)	0·98
Do. (Meiring)	n.r.

II. SOUTH-WEST—*continued.*	INCHES.
Worcester (Station)	0·62
Hex River	2·18
Lady Grey (Div. Robertson)	1·28
Robertson	1·44
Do. (Govt. Plantation)	1·12
Montagu	2·30
De Hoop (Div. Robertson)	2·02
Piquetberg Road	1·70
Ceres Road	1·18
De Doorns	1·74

III. WEST COAST:	
Port Nolloth	0 41
Do. (Howard)	n.r.
Klipfontein	2·11
Kraaifontein	2·13
O'okiep	2·21
Springbokfontein (Gaol)	3 29
Concordia	n.r.
Garies	n.r.
Kersefontein	1·18
The Towers	2·48
Dassen Island	0·86
Malmesbury	1·58
Piquetberg	2·23
Van Rhynsdorp	n.r.
Clanwilliam (Gaol)	n.r.
Do. (Seydell)	1 12
Welbedacht	n.r.
Hopefield	0 90
Lilyfontein	3·48
Zoutpan	0·51
Anenous	2·22

IV. SOUTH COAST:	
Cape L'Agulhas	1·76
Bredasdorp	2·88
Swellendam	3·37
Heidelberg	2·25
Riversdale	2·08
Geelbek's Vlei	1·88
Mossel Bay	1·79
George	5·22
Ezeljagt	4·15
Millwood	5·89
Sour Flats	4·77
Concordia	3·00
Knysna	2·18
Buffels Nek	5·69
Harkerville	4·61
Plettenberg Bay	2·19
Forest Hall	2·57

IV. SOUTH COAST—*continued.*	INCHES.
Blaauwkrants	2·41
Storm's River	4·26
Witte Els Bosch	3·96
Humansdorp	2 34
Cape St. Francis	2·99
Hankey	2·28
Witteklip	4·16
Van Staaden's (upper)	3·84
Do. (lower)	4 52
Uitenhage	3·29
Do. (Inggs)	2·66
Dunbrody	1·25
Port Elizabeth (Harbour)	2·51
Walmer Heights (near Port Elizabeth)	2·54
Tankatara	2·62
Lottering	4·21
Shark's River (Nursery)	2·67
Do (Convict Station)	2·37
Grootvader's Bosch	5·39
Karnmelks River	2·73
Armadale	1·88
Vogel Vlei	1·32
Great Brak River	2·31
Melkhoutfontein	2·12
Uitenhage Park	2·74

V. SOUTHERN KARROO:	
Touws River (D.E's. Office)	0·36
Do. (Station)	n.r.
Ladismith	1·08
Amalienstein	1·92
Calitzdorp	0·50
Oudtshoorn	1·58
Vlakte Plaats	2·66
Uniondale	2·67
Kleinpoort	n.r.
Glenconnor	1·50
Triangle	0·85
Grootfontein	0 12
Pietermeintjes	0 93
Bok River	2·14
Verkeerde Vlei	0·75

VI. WEST CENTRAL KARROO:	
Matjesfontein	
Prince Albert Road	0·30
Fraserburg Road	1·02
Prince Albert	0·60
Zwartberg Pass	3·92
Beaufort West	0·43
Dunedin	0·70
Nel's Poort	0·19
Camfer's Kraal	0 85
Lower Nel's Poort	0·30
Baaken's Rug	0·81
Willowmore	0 93
Steytlerville	0·03
Roosplaats	n.r.
Laingsberg	0·19

VII. EAST CENTRAL KARROO:	
Aberdeen (Gaol)	1·14
Do. (Bedford)	1·36
Aberdeen Road	n.r.

VII. E. C. KARROO—*continued.*	INCHES.
Rietfontein	2·05
Winterhoek	1·89
Klipdrift, De Erf	0·50
Kendrew (Holmes)	1·96
Graaff-Reinet	0·69
Do. (College)	0·80
New Bethesda	1·10
Roode Bloem	0·68
Wellwood	0·56
Do. Mountain	
Jansenville	1·21
Patrysfontein	0·95
Toegedacht	1·11
Klipfontein	0·89
Cranemere	n.r.
Pearston	0·70
Somerset East	1·87
Do. (College)	2·01
Longhope	n.r.
Middleton	n.r.
Corndale (Div. Aberdeen)	n.r.
Cookhouse	1·51
Doornbosch, Zwagershoek	n.r.
Middlewater	0·93
Darlington	0·23

VIII. NORTHERN KARROO:	
Calvinia	n.r.
Middlepost	n.r.
Sutherland	0·81
Rheboksfontein	n.r.
Fraserburg	0·70
Onderste Doorns	n.r.
Droogefontein	0·45
Gannapan	n.r.
Carnarvon	0·30
Wagenaar's Kraal	0·13
Brakfontein	n.r.
Vogelstruisfontein	n.r.
Victoria West	0·58
Britstown	0·89
Murraysburg	n.r.
De Kruis	n.r.
Richmond	n r.
De Aar	0·51
Middlemount	0·81
Hanover	0·81
Philip's Town	0·88
Borchfontein	0·44
Petrusville	0·00
The Willows	n.r.
Naauwpoort	0·58
Middelburg	0·00
Colesberg	0 50
Tafelberg Hall	n.r.
Rietbult (Colesberg Bridge)	0 24
Stonehills	0·26
Cradock	0·35
Do. (Rose)	0·39
Varsch Vlei	n.r
Witmoss	1 18
Steynsburg	0·45
Do. (Nesemann)	0·52

VIII. N. KARROO—*continued.*

	INCHES.
Daggaboer's Nek	1.71
Quagga's Kerk	n.r.
Tarkastad	1·82
Drummond Park	0·30
Riet Vlei	0·97
Brand Vlei	n.r.
Omdraai's Vlei	0·22
Zwagersfontein	n.r.
Varken's Kop	0·31
Culmstock	n.r.
Doorskuilen	0·78
Houwwater Dam	n.r.
Hillmoor	0·25
Glen Roy	1,25
Fish River	n.r.
Spitskop	0·95
Phizantefontein	0·66
Biesjesdam	0·95
Kleinhaasfontein	1.67

IX. NORTHERN BORDER:

Pella	0·14
Kenhardt	n.r.
Van Wyk's Vlei	0.88
Prieska	0.45
Dunmurry	n.r.
Griqua Town	0.68
Campbell	0,28
Douglas	n.r.
Avoca (Herbert)	0·57
Eskdale	0.00
Hope Town	0.14
Orange River	n.r.
Newlands (Div. Barkly West)	0·12
Groot Boetsap	n.r.
Kimberley (Gaol)	0·16
Do. (Stephens)	0·21
Bellsbank (Div. Barkly West)	n.r.
Barkly West	1·07
Upington	0·14
Trooilapspan	n.r.
The Halt	n.r.
Karree Kloof	0·15
New Year's Kraal	0·46

X. SOUTH-EAST:

Fairholt	2 06
Cheviot Fells (Bedford)	n.r.
Alicedale	n.r.
Bedford (Gaol)	3·02
Do. (Hall)	3·22
Sydney's Hope	2.54
Cullendale	n.r.
	1·94
Atherstone	2·16
Alexandria	n.r.
	2·48
Graham's Town (Gaol)	2·62
Do. (Bact.Inst.)	2·78
Heatherton Towers (near Graham's Town)	1·56
Fort Beaufort	1·94
Katberg	3·88
Balfour	

X. SOUTH-EAST—*continued.*

	INCHES.
Seymour	2·13
Glencairn	2·39
Alice	2·40
Lovedale	n.r.
Port Alfred	3·37
Hogsback	4·23
Thaba N'doda	11·62
Peddie	2·40
Cathcart	1·23
Keiskama Hoek	1·95
Dynamite	2·14
Thomas River	2·26
King William's Town	2·79
Do. Hospitaal	n.r.
Stutterheim (Wylde)	3·61
Do. (Besté)	3·19
Dohne	5·39
Kubusie	1·85
Blaney	n.r.
Kei Road	4·13
Evelyn Valley	7·16
Berlin	3·53
Isidenge	5·36
Perie Forest	4·53
Quacu Forest	4·24
Kologha	4·89
Fort Jackson	1·38
Komgha	2·92
Prospect Farm (Div. Komgha)	3·34
East London, West	2·29
Do. East	3·26
Fountain Head	2·13
Fort Cunynghame	3·83
Katberg Sanatorium	3·39
Cuylerville	n.r.
Bolo	n.r.
Fort Fordyce	2·72
Exwell Park, Waku	1·44
Melrose	2·14
Sunnyside	2·42
Chiselhurst	3·93
Sterkspruit	1·58
Scott's Bottom	2·16
Dontsah	4·46
Wolfridge	3·60
Cata	6·34

XI. NORTH-EAST:

Venterstad	0·15
Ellesmere	0·69
Burnley, Cyphergat	0·65
Burghersdorp	0·24
Do. (Le Roex)	0·21
Molteno Station	n.r.
Cyphergat	0·89
Thibet Park	1·79
Sterkstroom	0·69
Do. (Station)	0·98
Rocklands	1·02
Aliwal North (Gaol)	0·37
Do. (Brown)	0·62
Rietfontein	0·96
Buffelsfontein	n.r.
Hex's Plantation	2·33

XI. NORTH-EAST—*continued.*	INCHES.
Carnarvon Farm	0·52
Jamestown	0·69
Queenstown (Gaol)	2·80
Do. **(Beswick)**	n.r.
Dordrecht	0·47
Tylden	1·44
Snow Hill	n.r.
Herschel	1·85
Lady Grey	1·94
Bolotwa (Contest)	1·45
Lady Frere	1·12
Avoca (Div. **Barkly East)**	n.r.
Keilands	1·59
Barkly East	1·57
Glenlyon	6·49
Lyndene	n.r.
Mooifontein	0·84
Poplar Grove	1·27
Blesjesfontein	n.r.
Whittlesea	1·14
Blikana	2·82
Doornkop	n.r.
Halseton	0·38
XII. KAFFRARIA:	
Slaate, Xalanga	n.r.
Ida, Xalanga	n.r.
Cala, Xalanga	n.r.
Cofimvaba	n.r.
Nqamakwe	2·85
Main	2·01
Engcobo	3·15
Butterworth	2·52
Kentani	3·55
Maclear	n.r.
Idutywa	3·18
Willowvale	8 25
Mount Fletcher	2·48
Elliotdale	5·59
Mqanduli	6·22
Matatiele	n.r.
Umtata	4·47
Qumbu	3·98
Kokstad	2·71
Port St. John's	n.r.

XII. KAFFRARIA—*continued*	INCHES.
Umzimkulu	3.60
Woodcliff	n.r.
Tabankulu	4·00
Kilrush	3·80
Somerville (Div. Tsolo)	4·14
Tsomo	3·09
Seteba	2·68
Flagstaff	6.77
Quebe	4.98
Insikeni	5.88
Bazeya	7·55
XIII. BASUTOLAND:	
Mafeteng	2·69
Mohalie's Hoek	2·78
Qacha's Nek	2·88
Moyeni Quthing	3·56
Teyateyaneng	3 39
Leribe	n.r.
Butha Buthe	n·r.
Maseru	2·75
XIV. ORANGE RIVER COLONY:	
Bethulie	0·80
Bloemfontein	n.r.
Smithfield	n.r.
Kroonstad	4·82
XV. NATAL:	
Durban, Observatory	8·17
XVI. THE TRANSVAAL:	
Johannesburg (Park)	n.r.
Do. (Cemetery)	n.r.
XVII. BECHUANALAND:	
Vryburg	0.40
Taungs	0·71
XVIII. RHODESIA:	
Salisbury	2·99
Hope Fountain	5·06
Geelong	2·88
Chishawasha	5·80

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EDITORIAL NOTES.

A commanding trade undermined for the price of a few rams and ewes! Such is the only conclusion we can come to in reference to this Colony's former mohair traffic with America. If we glance at an article written by Mr. W. Hammond Tooke, of the Agricultural Department, in the *Journal* two or three years ago on America and the mohair trade, and then turn to some recent American mohair statistics, the case will appear plain. The Americans were, at the time of Mr. Tooke's article, deploring the deterioration of their mohair, and had begun to cast about for new blood, when an intelligent correspondent in one of [illegible] newspapers suggested importing breeding goats from the [illegible] He explained that it was very difficult to obtain pure

Angoras from slovenly, careless Turkey; therefore, said the writer "look to the Cape, where the breeders have already gone over the ground and paid for the experience that will profit us, because by it they have actually brought their best flocks to a greater and more uniform standard of excellence than those even in the country from which the stock originated." And the proposal of this brilliant correspondent caught on with a vengeance. The American agricultural papers took the matter up, and brought out points that showed South Africans to be a noble, generous people. The obstacles in the way of importing Turkish goats were declared to be insuperable, and the unspeakable Turk, himself, too hard to deal with, even if his goats had been up to the mark; the South African farmer, on the other hand, was so unsophisticated and unselfish that it was a positive relief and godsend, after thoroughly buttering him up about his prize rams and ewes, to treat with him for samples on terms reasonable. So in the magnanimous style of the nation that keeps open door for all comers and gives of its best to those who seldom either know of the existence or use of the word *reciprocity*, Cape Colony compiled a register of Angora goats which was regularly supplied to American buyers. Then Mr. Tooke came forward with his warning and his prophecy, in which he declared that it was manifestly so greatly to the advantage of American farmers to obtain breeding stock from the Cape that it must be equally to our advantage to frustrate their amiable designs. He objected to the Americans obtaining the results of our time, pains and energy gratuitously,—for the price of a ram or a couple of ewes could hardly be said to be an equivalent for the expenditure incurred by our farmers for many years past. We might certainly soon expect American buyers, and most probably sellers would get good prices, but they would be killing the goose that laid the golden egg. This was in 1899. At the close of 1901 we find a distinct revival in the mohair industry of the United States of America, and when one picks up agricultural newspapers that advertise the industry it is observable that advertisers make a point of letting the public know that their flocks are more or less of South African origin. For instance, advertisements such as the following are quite common:—"Mr. Brown is using in his flock this season one of the South African bucks imported by Mr. E. London."—"The competition in kids will undoubtedly be very keen next year as the offspring of the African bucks used upon the fine does in the flocks of Messrs. East and West will be on hand,"—"It will be a very interesting thing to see how the offspring of the African bucks imported by C. P. B. & Sons figure in the competitions at the forthcoming show," and so on, *ad infinitum*. Many pages in many American agricultural journals are almost filled with advertisements relating to Angora breeders; goats and mohair for sale; goats wanted; books on the industry; and advertisements of South African breeders living in Cape Colony anxious to supply more rams and ewes to our American competitors. Now, after this exciting recital, let us touch the subject's pulse and see how it beats. Our index finger points to the *American Wool and Cotton Reporter* of 5th December, which says: "With an increased introduction of Angora goats into this country and the enlarged production of domestic goat hair the latter is going into consumption more largely and is cutting more of a figure in the wool market. *The increased demand for domestic hair is already affecting the importations of Turkish and Cape mohair*"—and thus the Tooke prophecy is fulfilled and we are losing our American mohair trade, of which we might have had a monopoly, in return for the sale of a few rams and ewes. We don't begrudge any of our oversea relations a run of prosperity in any line; but every tub ought to stand on its own bottom, and the country that licks creation should not have been allowed to lick us out of any portion of our mohair trade. We fear it is rather late to fasten things up now, for our goats and their progeny are skipping about all over the United States; but surely we need not hasten the decline of our trade by shipping off any more breeding goats. Hurry up, Mozambique, and let us shut down. Study the best interests of your country, goat breeders, and forego the odd sixpences you make out of a few goats to America. Plenty of people are coming into South Africa who will be glad to buy your good goats. Send us particulars of your animals for sale and we will do our best for you.

Laugh and the world will laugh with you, weep and you'll weep alone, is a popular sophism. Our sympathies go out genuinely to the flock-masters of Argentina whose plight is depicted in lugubrious terms by the Argentine correspondent of the *Pastoral Review*, from which we publish a few extracts. General precipitancy in crossing the sheep of the country—a degenerate merino type—with the Lincoln breed without considering conditions of climate, soil and grasses, or bestowing a thought upon possible fashion freaks in the wool trade, has resulted in a wholesale collapse of wool values. Then there are those Argentine sheep worms! We would prefer the scab, for, *when* we tackle it in earnest, it will vanish for ever, as a plague, but, according to the correspondent, the worms of the Argentine sheep seem unconquerable.

Mr. J. P. de Waal, whose recent connection with the Agricultural Department as manager of the Government Wine Farm is a pleasurable recollection, writes from Cairo, giving some details of his visit to Bordeaux and other places. He was glad to find that Constantia methods are the same as at Bordeaux. The millions upon millions of vines in the Medoc, for instance, are trellised—one, two and three wires being used—and the two-wire system, as adopted at tia, was most approved, although much thinner wires are used. He gathered many notes for his forthcoming pamphlet, an interesting one being that our old friend "White Green Grape" is identical with the "Semillon" grape, more than 50 per cent. of which enters into the composition of the world-famed Chateau Yguem wine, which has been described as a "ray of sunshine concentrated in a glass." At Bordeaux and elsewhere the levure question has not advanced any further than the experimental stage. All the Bordeaux men shrugged their shoulders when questioned about the levure system, and from frank and open opinions expressed everywhere Mr. De Waal is convinced that genuine doubts widely exist and the system has few followers. The perfect soil and climate of the Medoc, combined with the fact that three-fourths of the vines cultivated are of the Cabernet Sauvignon variety, largely accounted for the excellent quality of most of the Bordeaux wines. The grafting stock of nine-tenths of the reconstituted vineyards is the Riparia Gloire de Montpellier.

Dr. Hutcheon, Chief Veterinary Surgeon, is back at the Agricultural Department. He had a warm welcome on his arrival and seemed as glad to get home as we all were to have him. He says he has a wallet full of good things for the *Journal.*

Mr. Willcocks has got all the points of the Karoo noted up in his report. He sees how, for want of fences, the nutritious herbage is fast being trodden out of existence by the vagrant sheep, goats, horses and cattle that roam and scamper over the unfenced lands; how the waters falling direct from the clouds and streaming from the mountain sides find their way into the storm-made dongas only to run to waste while they widen and deepen the unsightly chasms and fritter away the chances of redeeming the land for cultivation. Accompanied by two sketches he shows how easily and inexpensively nature run wild might by the attentions that are due to her be won over to serve the farmer's best interests. The information in the report will doubtless be noted in turn by those whom it is intended to benefit, and whether the Government does the work thus specially indicated or not there is no reason why it should be left undone.

QUERIES AND REPLIES.

To the Editor.

Will you bear with me for writing to you as follows in reference to the supply of matter to the *Agricultural Journal* of local interest.

I think it is necessary that the *Journal* should be the medium through which the writings of the skilled practical experts of other countries, with climatic conditions similar to ours, should reach the farming community of this Colony. In many of our rural pursuits we have benefited even to the point of emulation by the experience of other countries, such as lie within the wide domain of the United States of America and Australia; but how is it possible to continue this course unless we keep in touch with other folks' sayings and doings. Probably not one farmer in a thousand ever gets an American or Australian agricultural journal, nor even an extract from such a journal. I don't suppose our newspapers, not excepting the Cape Town dailies, ever exchange their issues for the official organs of the Agricultural Departments of the world. I suppose the Agricultural Department does so and therefore ought to be able to give us, to some extent, at least, the benefit of the writings of the practical experts of other countries. I think the desire for matter of local interest will be partially complied with, when you make such excerpts as may be used applicable to local conditions. The day will probably come when we shall be comparatively independent of outside authorities, but that day is not yet; on the other hand, we want to absorb and use all we can, while we are, in some respects, emerging from a chrysalis condition.

G.S.

We have noted what G.S. says, and shall always try and give the best information we can whether obtained at home or abroad.

EDITOR.

Through your paper I should like to know how it is with cow manure ash. Can it be used for the same purpose as wood ash?

JOHN HITE.

Yes. But before using the ashes as manure the correspondent should, of course, satisfy himself that the plant food most needed for his soil is potash, that being the principal ingredient contained in these ashes.—EDITOR.

Will you kindly inform me which is the best manure to use on dry lands for growing cereals, also how to apply same, where to purchase them and their probable cost? Several of us here wish for this information and shall be thankful for it.

T. MASTERSON.

For the improvement of your wheat lands, which I presume are more or less sandy, I do not think you can do better than fetch up their content of phosphates by a considerable dressing of Thomas' slag. This contains, according to sample, something over 50 per cent. of phosphate of lime, in a condition which is more readily available to cereals than is the phosphate of ground bones. Of course ground bones are very good, but they are extremely slow to give up their goodness to the crops. If you remedy this by mixing the ground bones with the proper proportion of sulphuric acid, it is true that you turn the phosphoric acid out in an extremely soluble and usable condition. But then the chances are that there comes a spell of wet weather just after you have given a dressing of this mixture (superphosphate, as it is called), and then it is apt to get leached out and you simply lose your money.

Therefore, all things considered, I think you would do well to rely upon a good dressing of this same Thomas' phosphate, ploughing it in, but not so deep as to put it in below the tilth in which your wheat would grow.

I can't give you the statement in inches because I don't know precisely what your system in ploughing has been; the thing is, in your light soil, to keep it present in the working tilth. Well then, sandy soil is likely to be deficient in humus, hence whatever manure of the ordinary kind you can secure will come in along with the artificial dressing and will do good service. I cannot recommend you to use guano. Where you are it is probable you would get far too much straw and leafage on your crop, and the grain would thrash out below your expectations.

For cereals, generally speaking, the amount of superphosphates used is from 2 to 3 cwt. to the acre, on soils containing a fair proportion of lime. Basic Slag or Thomas' phosphate, 3 to 5 cwt. per acre if the soil is deficient in lime. A dressing of nitrate of soda, ¼ to ¾ cwt., will increase the stalk and will make the oat and hay fuller in the bundle.

Any of these commercial fertilizers may be obtained from the wholesale dealers at the Bay.

E.P.

COUNTRY REPORTS.

Bizana.

H. Sprigg, R.M., Dec. 1901.—The rinderpest has died out, having never spread beyond the herd in which it first broke out. The excessive rains have continued throughout December, many of the crops are consequently not looking so well as might be wished. The mealies have suffered much from worm, and in some places locusts have eaten off the young crops.

Butterworth.

J. M. Young, Acting R.M., 4th Jan., 1902.—The month of December was an exceedingly dry one and in consequence the pasturage and crops have a very withered appearance. There is no disease amongst cattle and horses and small stock are in excellent condition.

Elliot.

J. P. Cumming, R.M., 31st Dec. 1901.—Better crops of forage appear to have been realized this year than in years past. The outbreak of rinderpest in the western portion of the district has entirely disappeared. There are two cases of lung-sickness in the district.

Elliotdale.

W. T. Hargreaves, R.M., 16th Dec., 1901.—A great deal of rain fell during the month, consisting of steady mist rains lasting several days and violent thunderstorms. A little hail fell but fortunately did no damage. The natives have nearly finished ploughing their gardens, and are now everywhere busily engaged in weeding and hoeing. The prospects of a good harvest are regarded as excellent. Large swarms of red-winged locusts came in from Pondoland and did considerable damage to the mealie crops, but fortunately they soon died off or left the district, travelling towards the Willowvale district. A few have laid eggs which will be dealt with with fungus as soon as hatched. The pasturage is excellent and stock of all descriptions are in good health and condition.

Flagstaff.

J. F. C. Rein, R.M., 31st Dec., 1901.—The month just closing, from the agriculturist's point of view, was disappointing, as it was by no means favourable to the growing crops, the continuous wet weather having considerably damaged the more advanced fields. There were only eight days during the month in which no rainfall was registered, and on most of those days foggy weather prevailed, so that there has been but little sunshine to help the growth of cereals; on the other hand, weeds have grown apace, as owing to the nature of the weather it has been difficult to exterminate them. The rainfall of the last four months has amounted to 28 inches. The pasturage continues in good condition and all stock are looking excellent. No diseases amongst them have been reported.

Idutywa.

A. Gilfillan, A.R.M., 7th Jan., 1902.—The weather during the month has been mild with the exception of a few very hot days; a fair quantity of rain fell, sufficient to keep the pasturage green. Stock both large and small are in good condition and free from contagious diseases. There was one case of sickness reported as redwater, but I am pleased to say it has turned out to be a false report.

Libode.

J. Colburn Garner, R.M., 3rd Jan., 1902.—During the whole of last month copious and constant rains visited the district, and the crops are now looking splendid. Locusts made their appearance at the Mgazi and Umzimvulu, but fortunately they did but little damage to the growing crops. A case of lung-sickness was reported in the early part of the month, and inoculation was promptly resorted to and the affected cattle quarantined. Otherwise stock of all kinds are looking at their best and there is no disease amongst them.

Lusikisiki.

R. W. Stanford, R.M., 31st Dec., 1901.—Continuous and heavy rains have fallen throughout the district, and in some parts the young crops are suffering from a superabundance of water. Among live stock there is nothing of consequence to report, they being in their usual state of good health and condition. The locusts which arrived in large swarms some weeks ago are reported to have died.

Mqanduli.

L. Farrant, R.M., Dec. 1901.—There is nothing fresh to report. There has fallen a very large quantity of rain, and the amount of land under cultivation is larger than it has been since 1898. The harvest gives promise of being exceptionally prolific. The locusts came in November on a few days' visit from Pondoland and the damage they did was evaded by re-ploughing and sowing the lands destroyed totally, and in others by replenishing the seed at places where recovery seemed doubtful. Stock are fat, but ticks are so numerous that poor horses become badly affected; there have been one or two cases of sickness amongst horses but no deaths. Two horses were shot on suspicion of farcy, but these were then duly reported to me and I had them buried where destroyed.

Tabankulu.

R. H. Wilson, A.R.M., 31st Dec., 1901.—I regret to have to report the outbreak of lung-sickness in this district. It appears that a great many cattle have been brought into the district and exchanged for-horses; these are now affected with the disease. Unfortunately the cattle have been purchased by a number of natives and as the kraals are scattered there is more danger of the disease getting a hold. Every endeavour is being made to confine the disease to those cattle which have been brought into the district, and so far they are the only ones affected. The cattle have been inoculated and the kraals quarantined. The crops are in splendid condition and there is every prospect of an abundant harvest.

Tsomo.

W. J. G. Thompson, R.M., Dec. 1901.—The rainfall registered during the past month was 2.08 inches. Two reports of lung-sickness and two of redwater were recorded during the month. Locusts have not yet made their appearance in the district. Stock on the whole are in good condition.

Umtata.

A. H. Stanford, R.M., 4th Jan., 1902.—During the past month the rainfall has been sufficient and the mealie crops are coming on well. Stock are in good condition, but lung-sickness continues in several locations as well as redwater in stock brought from the Colony.

Willowvale.

M. W. Liefeldt, R.M., 31st Dec., 1901.—On the 9th inst. I informed you that an enormous swarm of locusts, extending from Bashee to Qora and from the coast ten miles inland, was travelling west and destroying all crops *en route*. The swarm almost entirely swept the belt of country of all crops and passed on towards Kei Mouth. But most fortunately the plague was followed by three days' rain, and it is wonderful to see how Kaffir corn lands and some of the mealie at once revived and are now again promising a fair crop. The mealie lands entirely destroyed were at once re-ploughed, and unless visited by a similar plague sufficient grain may yet be reaped to prevent actual starvation. There have been no fresh outbreaks of contagious disease during the month.

Xalanga.

E. H. Hogge, R.M., 9th Jan., 1902.—December proved an exceptionally dry month and in consequence growing crops have suffered a good deal. The wheat has now all been reaped, and I understand the return will be better than it has been for many years past. Forage is good and plentiful. Stock of all kinds are looking well. Lung-sickness in a mild form has broken out in places in the district.

AGRICULTURE.

Experiments with Manures on Cereals.

The following experiments were instituted in order to gain an insight into the effect of manures upon the wheat and oat crops and to test on a more extensive scale the results arrived at in the experiments conducted at the School of Agriculture, Elsenberg, during the year 1900.

The conclusions from the previous year's experiments on wheat may be briefly stated as follows :—

1. A general manure is of great value when used in moderation·
2. Any additional quantity of manure beyond a certain very moderate amount not only fails to give a corresponding increase, but actually exerts a deleterious influence upon the crop.
3. That potash manures fail to give any good result, and it would appear that they diminish the return when used in conjunction with either nitrogenous or phosphatic manures.
4. That nitrogenous manures—especially nitrate of soda—yield beneficial and satisfactory returns.

The present season's tests were simultaneously started at Occultdale, Koeberg; Alexandrafontein, Darling; Haartebeestfontein, Malmesbury; Knolfontein, Paarl; Bellevue, Hermon; and at Elsenberg, Stellenbosch; but owing chiefly to the restrictions of Martial Law it has not been found possible to carry all to a conclusion.

The plots of each variety of manure tried have been 1/16th acre, and with the exception of the manuring,. the treatment has been the same as is customary in the various districts. The quantity and variety of seed, the method of sowing and the general management has been exactly similar to that adopted by the farmer in the management of his own crop.

With the exception of nitrate of soda, which was given as a top-dressing when the crop was a few inches high, all the manures were applied at the time of sowing and harrowed in with the seed.

WHEAT AT OCCULTDALE: KOEBERG DISTRICT.

No	MANURE.	Lbs. applied per acre.	Yield of Straw per acre.	Yield of Grain per acre.	Total yield per acre.	Increase of Straw per acre.	Increase of Grain per acre.	Cost of Manure per acre.	Money Increase per acre.
								£ s. d.	£ s. d
1	Superphosphate	200 lbs	1392	560	1952	432	240	0 10 0	1 13 7½
2	Nitrate of Soda	100 ,,	1136	464	1600	176	144	0 10 6	0 18 6
3	Muriate of Potash	60 ,,	1160	440	1600	200	120	0 6 0	0 16 6
4	Superphoshate	100 ,,	1480	544	2024	520	224	0 15 0	1 13 11
	Nitrate of Soda	100 ,,							
5	Superphosphate	200 ,,	1800	600	2100	840	280	0 16 0	2 5 11½
	Muriate of Potash	60 ,,							
6	Superphosphate	100 ,,	1568	592	2160	608	272	0 13 0	2 0 0
	Nitrate of Soda	50 ,,							
	Muriate of Potash	30 ,,							
7	Same as No. 6	200 ,, 100 ,, 60 ,,	2048	720	2768	1088	400	1 6 0	3 3 5
8	Do.	400 ,, 200 ,, 120 ,,	1808	560	2368	848	210	2 12 0	2 1 11½
9	Basic Slag	200 ,,	1856	656	2512	896	336	0 7 0	2 12 11
10	Sulphate of Ammonia	70 ,,	1304	456	1760	344	136	0 8 10	1 1 0½
11	Kainit	200 ,,	960	432	1392	..	112	0 8 0	0 11 8
12	Basic Slag	200 ,,	1480	472	1952	520	152	0 15 0	1 6 3
	Kainit	200 ,,							
13	Basic Slag	200 ,,	1728	544	2272	768	224	0 15 10	1 18 8
	Sulphate of Ammonia	70 ,,							
14	Kainit	200 ,,	928	336	1264	32	16	0 16 10	0 1 0½
	Sulphate of Ammonia	70 ,,							
15	Basic Slag	200 ,,	1864	376	2440	904	256	1 5 10	2 4 9
	Sulphate of Ammonia	70 ,,							
	Kainit	200 ,,							
16	Same as No. 15	400 ,, 140 ,, 400 ,,	1904	512	2416	944	192	2 11 8	1 18 10½

WHEAT AT OCCULTDALE: KOEBERG DISTRICT.—*Continued.*

No.	MANURE.	Lbs. applied per acre.	Yield of Straw per acre.	Yield of Grain per acre.	Total Yield per acre.	Increase of Straw per acre.	Increase of Grain per acre.	Cost of Manure per acre.	Money Increase per acre.
								£ s. d.	£ s. d.
17	Government Guano	200 lbs.	1704	544	2248	744	224	0 12 6	1 18 2½
18	Kraal Ash	200 „	1168	480	1648	208	160	0 5 0	1 0 10
19	Government Guano .. .. Muriate of Potash	200 „ 60 „	1248	384	1632	288	64	0 18 6	0 12 5
20	Test Plot		960	320	1280		..	..	..

WHEAT AT BELLEVUE: HERMON DISTRICT.

No.	MANURE.	Lbs. per acre.	Grain per acre.	Straw and Chaff per acre.	Total.	Increase of Grain per acre.	Increase of Straw per acre.	Value of Manure.	Money Increase per acre.
								£ s. d.	£ s. d.
1	Superphosphate	200 lbs.	154	464	618	106	304	0 10 0	0 16 11½
2	Nitrate of Soda	100 „	80	216	296	32	50	0 10 6	0 4 4
3	Muriate of Potash	60 „	32	176	208	16	50	0 6 0	0 8 0
4	Superphosphate .. .. Nitrate of Soda	100 „ 100 „	144	464	608	96	304	0 15 0	0 15 3
5	Superphosphate .. .. Muriate of Potash	200 „ 60 „	128	288	416	80	126	0 16 0	0 10 10
6	Superphosphate .. .. Nitrate of Soda .. .. Muriate of Potash	100 „ 50 „ 30 „	96	284	480	48	224	0 13 0	0 10 7½
7	Superphosphate .. .. Nitrate of Soda .. .. Muriate of Potash	200 „ 100 „ 60 „	432	1008	1440	384	848	1 6 0	2 16 11½

No.	MANURE.	Lbs. per acre.	Grain per acre.	Straw and Chaff per acre.	To	Grain r acre.	Increase of Straw per acre.	Value of Manure	Money Increase per acre.
								£	£ s. d.
8	Superphosphate	400 lbs.	352	768	1120	04	608		2 3 10
	Nitrate of Soda	200 „							
	Muriate of Potash	120 „							
9	Basic Slag	200 „	176	368	544	28	208	0 7 0	0 1, 6
10	Sulphate of Ammonia	70 „	80	240	320	32	80	0 8 10	0 4 11
11	Kainit	200 „	64	240	304	16	80	0 8 0	0 3 3
12	Basic Slag	200 „	208	480	688	60	320	0 15 0	1 3 1
	Kainit	200 „							
13	Basic Slag	200 „	176	512	688	28		0 0	4
	Sulphate of Ammonia	70 „							
14	Kainit	200 „	48	160	208			6 10 0	..
	Sulphate of Ammonia	70 „							
15	Basic Slag	200 „	224	768	992		608	1 5 10	1 10 6
	Sulphate of Ammonia	70 „							
	Kainit	200 „							
16	Basic Slag	400 „	416	1120	536	368	960	2 11 8	2 17 11
	Sulphate of Ammonia	170 „							
	Kainit	400 „							
17	Government Guano	200 „	152	504	656	104	344	0 12 6	0 17 8½
18	Kraal Ash	200 „	..	..	..	..	..	0 5 0	..
19	Government Guano	200 „	208	656	864	160	496	0 18 6	1 6 7
	Muriate of Potash	60 „							
20	Stable Manure	8 tons	256	648	904	208	488	..	1 11 7
21	Do. with No. 6 ..	8 „	240	656	896	192	490	..	1 9 10½
22	Test Plot	..	48	160	208				

No	MANURE.	Lbs. r acre.	Yield of Grain per acre.	Straw and Ch per acr	To	Increase of Grain per acre.	Increase of Straw per acre.	Value of Manure	e o. ase
								£	£ s
1	Superphosphate	200 lbs.	[illegible]	656	944	92	424	0	1 8
2	Nitrate of Soda	100 ,,	256	672	928	60	440	0	1 5
3	Muriate of Potash	60 ..	200	408	608	04	176	0	0 14
4	Superphosphate	100 ,,							
	Nitrate of Soda	100 ,,	..	..	..	.	..	..	..
5	Superphosphate	200 .,	264	712	976	68	480	0 16 0	1 7 1
	Muriate of Potash	60 ,,							
6	Superphosphate	100 ,,	320	656	976	24	424	0 13 0	1 11 10
	Nitrate of S	50 ,							
	Muriate of Potash	30 ,,							
	Superphosphate	200 ,,		1016	520		784	6 0	2 18 2
	Nitrate of Soda	100 ,,							
	Muriate of Potash	60 ,,							
	Superphosphate	[illegible]	8	352	480	32	120	2 12 0	0 5 9
	Nitrate of Soda								
	Muriate of Potash								
9	Basic Slag ..		8	840	288	352	608	0 7 0	2 8 10
0	Sulphate of Ammonia		2	600	872	176	368	0 8 10	1 5 8
1	Kainit ..		6	816	152	240	584	0 8 0	1 16 8
2	Basic Slag ..		6	624	880	160	392	0 15 0	1 4 7
	Kainit ..								
3	Basic Slag ..	[illegible]		944	280		712	0 15 10	1 19 6
	Sulphate of Ammonia	70							
4	Kainit ..	00		584	824		352	0 16 10	1 2 0
	Sulphate of Ammonia	70							
5	Basic Slag ..	00		1072	520		840	1 5 10	2 13 5
	Sulphate of Ammonia	70							
	Kainit ..	00							
6	Basic Slag ..	00		672			440	2 11 8	1 2 11
	Sulphate of Ammonia	40							
	Kainit ...	00							

WHEAT AT HARTEBEESTFONTEIN: MALMESBURY DISTRICT.—*Continued.*

No.	MANURE.	Lbs. per acre.	Yield of Grain per acre.	Straw and Chaff per acre	Total.	Increase of Grain per acre.	Increase of Straw per acre.	Value of Manure.	Value of Increase.
								£ s. d.	£ s. d.
17	Government Guano	200 lbs.	208	640	848	112	408	0 12 6	0 19 10
18	Kraal Ash	200 ,,	128	336	464	32	104	0 5 0	0 5 4
19	Government Guano .. .. Muriate of Potash	200 ,, 60 ,,	192	416	608	96	184	0 18 6	0 13 8
20	Test Plot	..	96	232	328	..	..		

WHEAT AT ALEXANDRAFONTEIN: DARLING DISTRICT.

No.	MANURE.	Quantity per acre	Grain per acre.	Straw and Chaff per acre.	Total.	Increase per acre, Grain.	Increase Straw.	Cost of Manure.	Value of Increase.
								£ s. d.	£ s. d
1	[illegible]	[illegible]	[illegible]		[illegible]	20	[illegible]	0 10 0	0 13 9
2	Nitrate of So	100	80		408	8	0	0 10 6	
3	Muriate of Potash	60	136		512	48	8	0 6 0	0 5 1
4	Superphosphate Nitrate of Soda	100 100	248		912	60	6	0 15 0	1 2 7
5	Superphosphate Muriate of Potash	200 60	152		528	64	8	0 16 0	0 6 10
6	Superphospha Nitrate of Soda Muriate of Pot	100 50 30	176			04	8	0 13 0	0 10 1
7	Same as No. 6	200 100 60			072			6 0	1 9 2

WHEAT AT ALEXANDRAFONTEIN: DARLING DISTRICT.—*Continue*

No.	MANURE.	Quantity per acre.	Grain per acre.	Straw and Chaff per acre.	Total.	Increase of Grain per acre.	Increase of Straw	Cost of Manure.	ue of ease.
								£ s. d.	£ s. d.
8	Same as No. 6	400 lbs. 200 „ 120 „	192	416	608	104		2 12 0	0 11 9½
9	Basic Slag	200 „	224	464	688	136		0 7 0	0 16 2
10	Sulphate of Ammonia	70 „	128	336	464	40		0 8 10	0 4 9
11	Kainit	200 „	120	336	456	32		0 8 0	0 2 9
12	Basic Slag .. .. .. Kainit	200 „ 200 „	160	384	544	72		0 15 0	0 7 10
13	Basic Slag .. .. .. Sulphate of Ammonia	200 „ 70 „	160	416	576	72		0 15 10	0 8 6
14	Kainit .. .. .. Sulphate of Ammonia	200 „ 70 „	104	368	472	16		0 16 10	0 1 8
15	Basic Slag .. .. .. Sulphate of Ammonia .. .. Kainit	200 „ 70 „ 200 „	152	320	472	64	48	1 5 10	0 5 8
16	Same as No. 15	400 „ 150 „ 400 „	112	320	432	24	48	2 11 8	0 1 6
17	Government Guano	200 „	120	344	464	32	24	0 12 6	0 2 11
18	Kraal Ash	200 „	64	336	400	24	32	0 5 0	..
19	Government Guano .. .. Muriate of Potash	200 „ 60 „	112	448	560	24	80	0 18 6	0 4 1
20	Test Plot	..	88	368	456	..			

The results of these experiments very clearly demonstrate that in order to obtain a maximum crop from our ordinary grain soils it is essential that the manuring should be a general one; *i.e.*, that we should apply a mixture of phosphatic, potassic and nitrogenous fertilizers. In every one of the tests manures of this description have yielded the greatest crop. It is also definitely shown that very heavy dressing will not pay, as not only do they not give a proportionate increase but in the majority of cases they have acted injuriously.

This can be seen from the following extracts:—

Station.	100 lb. Superphosphate 50 „ Nitrate 30 „ Muriate of Potash.	200 lb. Superphosphate 100 „ Nitrate 60 „ Muriate of Potash.	400 lb. Superphosphate 200 „ Nitrate of Soda 60 „ Muriate of Potash.
Koeberg ..	2,160 lb. per acre	2,768 lb. per acre	2,368 lb. per acre
Darling ..	416 „	784 „	416 „
Malmesbury	976 „	1,520 „	480 „
Hermon ..	480 „	1,440 „	1,120 „

Station.	200 lb. Basic Slag 70 „ Sulphate of Ammonia 200 „ Kainit.	400 lb. Basic Slag 140 „ Sulphate of Ammonia 400 „ Kainit.
Koeberg	2,240 lb. per acre	2,416 lb. per acre
Darling	472 „	432 „
Malmesbury ..	1,520 „	896 „
Hermon	992 „	1,536 „

In every case the medium quantity of the mixture of Superphosphate, Nitrate of Soda and Muriate of Potash gave a better return than either the small or the heavy dressings, and in 3 out of the 4 experiments with a mixture of Basic Slag, Sulphate of Ammonia and Kainit the less quantity produced the greater yield.

The returns from single manures are also instructive. Basic Slag and Superphosphate were selected as the most suitable phosphatic manures, and in every case they have given increases which more than justify their application.

Station.	Basic Slag, 200 lb. per acre. Increase.		Superphosphate, 200 lb. per acre. Increase.	
	Grain.	Straw.	Grain.	Straw.
Koeberg ..	336	896	240	432
Darling ..	136	96	120	64
Malmesbury ..	352	603	192	424
Hermon ..	128	208	106	304

Of the two manures Basic Slag has proved superior, and when we consider (1) that it is about £1 10s. per ton cheaper, and (2) that whilst Superphosphate exhausts itself in the course of the first year, Basic Slag may be expected to show its influence for at least two more seasons, there can be no doubt as to which is the preferable fertilizer.

Nitrate of Soda and Sulphate of Ammonia are purely nitrogenous manures and their action throughout the tests must be considered as disappointing. This is the more strange when we find that last year the former gave such excellent results. In all probability the dry season is the cause of their failure. Comparing the two manures Sulphate of Ammonia has answered the better, though we must remember that Nitrate of Soda was only applied as a top dressing after the crop was well up, and that no quantity of rain fell after its application. It would therefore seem that if any appreciable increase is to be obtained from this manure care must be taken to have it applied before the dry season sets in.

Potash manures, when applied alone, have usually produced a small increase in the crop, though in the majority of cases the additional yield has not been sufficient to justify their application.

The Kraal Ash is similar to that obtained by the Stellenbosch Fruit-growers' Association. It is obtained from Laingsburg and contains about 14 per cent. potash, but its effect on wheat crops cannot in any way be considered promising. On the whole I consider that it is evident that the supply of phosphates must be considered of prime importance in the manuring of the wheat crop, and though the action of potassic and nitrogenous manures when applied alone are less sure in their action, still their use can be more than justified when used as components of a complete manure. If I were asked for a suitable fertilizer for wheat I should have no hesitation in recommending something like 200 lb. Basic Slag, 75 lb. Nitrate of Soda and 50 lb. Muriate of Potash per acre. If possible the Basic Slag should be sown a few months before the crop and harrowed in, whilst the Nitrate of Soda might be given as a top dressing when the crop was nicely out of the ground. The Muriate of Potash should be sown along with the seed.

OATS AT BELLEVUE: HERMON DISTRICT.

No	MANURE.	Quantity per acre.	Grain	Straw.	Total.	Increase Grain.	Increase Straw.
1	Superphosphate ..	200 lbs.	..	..	..	..	
2	Nitrate of Soda ..	100 ,,	400	624	1024	..	144
3	Muriate of Potash ..	60 ,,	432	736	1168	32	256
4	Superphosphate ..	100 ,,	592	1088	1680	192	608
	Nitrate of Soda ..	100 ,,					
5	Superphosphate ..	200 ,,	448	720	1168	48	240
	Muriate of Potash ..	60 ,,					
6	Superphosphate ..	100 ,,	384	580	864	16	100
	Nitrate of Soda ..	50 ,,					
	Muriate of Potash ..	30 ,,					
7	Same as No. 6 ..	200 ,,	480	640	1120	80	160
		100 ,,					
		60 ,,					
8	Do.	400 ,,	416	752	1168	16	272
		200 ,,					
		120 ,,					
9	Basic Slag ..	200 ,,	400	672	1072	..	192
10	Sulphate of Ammonia	70 ,,	320	528	848	80	48
11	Kainit	200 ,,	768	1212	1980	368	732
12	Basic Slag ..	200 ,,	624	1264	1888	224	784
	Sulphate of Ammonia	70 ,,					
13	Basic Slag ..	200 ,,	704	1456	2160	304	976
	Kainit	200 ,,					
14	Kainit	200 ,,	480	1024	1504	80	544
	Sulphate of Ammonia	70 ,,					
15	Basic Slag ..	200 ,,	400	720	1120	..	240
	Sulphate of Ammonia	70 ,,					
	Kainit	200 ,,					
16	Same as No. 15 ..	400 ,,	464	720	1184	64	240
		140 ,,					
		400 ,,					
17	Government Guano ..	200 ,,	576	976	1552	116	496
18	Kraal Ash ..	200 ,,	720	944	1664	320	464
19	Government Guano ..	200 ,,	..	..	..	..	..
	Muriate of Potash ..	70 ,,					
20	Test Plot	..	400	480	880	..	..

OATS AT HARTEBEESTFONTEIN: MALMESBURY.

1	Superphosphate ..	200 lbs.	480	656	1136	320	256
2	Nitrate of Soda ..	100 ,,	224	528	752	64	128
3	Muriate of Potash ..	60 ,,	320	576	896	160	176
4	Superphosphate ..	100 ,,	560	768	1328	400	368
	Nitrate of Soda ..	100 ,,					
5	Superphosphate ..	200 ,,	416	736	1152	256	336
	Muriate of Potash ..	60 ,,					
6	Superphosphate ..	100 ,,	304	832	1136	144	432
	Nitrate of Soda ..	50 ,,					
	Muriate of Potash ..	30 ,,					
7	Same as No. 6 ..	200 ,,	544	992	1536	384	592
		100 ,,					
		60 ,,					
8	Do.	400 ,,	400	912	1312	240	512
		200 ,,					
		120 ,,					

OATS AT HARTEBEESTFONTEIN: MALMESBURY—*Continued.*

No.	MANURE.	Quantity per acre.	Grain	Straw	Total	Increase Grain	Increase Straw
9	Basic Slag ..	200 lbs.	400	992	1392	240	592
10	Sulphate of Ammonia	70 ,,	252	432	684	92	32
11	Kainit	200 ,,	286	592	878	126	192
12	Basic Slag ..	200 ,,	256	656	912	96	256
	Sulphate of Ammonia	70 ,,					
13	Basic Slag ..	200 ,,	352	688	1040	192	288
	Kainit	200 ,,					
14	Kainit	200 ,,	320	800	1120	160	400
	Sulphate of Ammonia	70 ,,					
15	Basic Slag	200 ,,	304	640	944	144	240
	Sulphate of Ammonia	70 ,,					
	Kainit	200 ,,					
16	Basic Slag	400 ,,	400	608	1008	240	208
	Sulphate of Ammonia	140 ,,					
	Kainit	400 ,,					
17	Government Guano ..	200 ,,	144	400	544	16	..
18	Kraal Ash	200 ,,	208	480	688	48	80
19	Government Guano ..	200 ,,	160	432	592	..	32
	Muriate of Potash ..	60 ,,					
20	Test Plot	..	160	400	560	..	..

The results from the oat crop are scarcely complete enough to justify an expression of opinion, further than to state that the general tendency is much the same as for wheat and that complete manures again come out best.

The effect of guano is contradictory. In one instance it gives a large increase and in the other the yield is less than the unmanured plot. The soil at Hermon was much damper and lower lying than that at Malmesbury, which no doubt accounts for the difference. Guano does not do well on high ground in dry seasons. In conclusion I should like to express my thanks to those farmers who have placed their lands and labour at my disposal, and also to Mr. E. A. Visser, who has been of great assistance to me in the superintendence of all work connected with the experiments.

WM. MASON, Principal,
Agricultural School, Elsenberg.

Report on Irrigation in South Africa.

By Mr. W. Willcocks, C.M.G., M.I.C.E.,

Addressed to His Excellency Lord Milner, P.C., G.C.B., G.C.M.G., High Commissioner for South Africa.

(*Continued from page* 169.)

The Karoo Veld in the Prince Albert District, 1,500 to 2,000 Feet above Sea-level.

The rainfall in this district, which, with the Beaufort West District, is known as the Gouph (pronounced Cope), is between five and ten inches per annum. This light rainfall, coupled with the severe slope of the country, renders numerous irrigation projects of any importance as quite out of the question. The Karoo bushes here are, however, of the best quality and are deserving of being developed. I have not seen a single farmer who does not say that there is a steady diminution year by year of these good and serviceable shrubs, with a corresponding increase of the useless bushes and plants. The goats, sheep and donkeys are perpetually eating down the good plants and preventing the young plants from coming on, while their place is being taken in great part by undesirable bushes. Some farmers go so far as to say that 25 years ago the Karoo could have supported twice the number of sheep it can support to-day. Judging from the information I have received, a sheep needs some eight acres of this veld for its support to-day. The farmers were unanimous in stating that the sheep tracks had all become little rivulets in flood, and helped the rain water to run quickly off the surface, and consequently penetrate the soil less than formerly. This action had dried the veld and converted the main rivers into torrents with clean well-swept beds, while formerly they had consisted of wide stretches of alluvium covered with trees and shrubs, which retained a good deal of moisture throughout the year. The Karoo veld may be divided into two categories :—

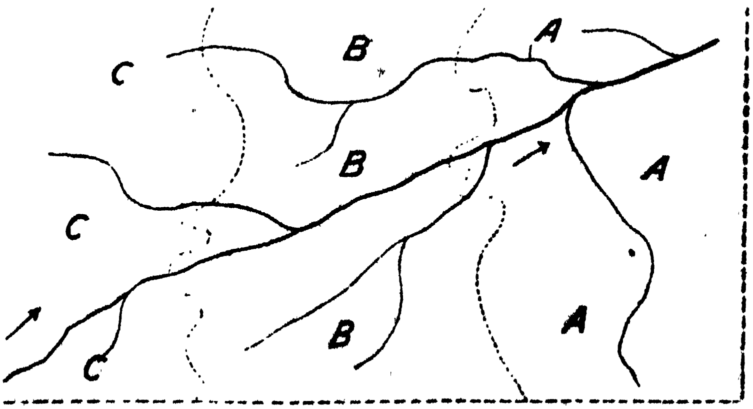
(1.) The undulating natural veld, consisting of decayed rock with a thin layer of soil and Karoo bushes.

(2.) The alluvium of the depressions, consisting of a greater or less depth of soil washed off the veld, and covered with acacia trees and Cape willows, dwarf tamarisks, and other shrubs. The area covered with alluvium is considerable.

Here and there the valleys are crossed by impervious dykes, and a little water finds its way to the surface and supports a more vigorous growth of plants. In places, the water which comes to the surface is sufficient to irrigate some eight or ten acres of crops, and here the farmsteads of the Karoo are situated. The alluvium produces first-class crops. These impervious dykes can be recognised in the driest parts of the Karoo by the presence of the coarse grasses forcing their way through the stratified rocks. Many wells have been bored in such places, and sufficient water obtained with the aid of windmills for watering stock and insuring the irrigation of a few acres of land. For this country two classes of remedies naturally suggest themselves, one for the undulating Karoo proper, and the other for the alluvium in the depressions.

(1.) In the Karoo steps should be taken to prevent the diminution and eventual extermination of the good Karoo plants. It is not improbable that, in the early days, the deserts of Egypt, Sinai and Palestine were covered with succulent bushes which supported hundreds of thousands of animals and enabled a pastoral and nomad people to exist in numbers which to-day seen ridiculously exaggerated. The old Hebrew prophets describe the gradual change by the three expressions :—

"The wilderness, the dry lands and the desert." What was a wilderness to begin with gradually degenerated into a dry land, and after hundreds of years of eating down by goats, donkeys and camels, has become unmitigated desert. This fate threatens the Karoo of South Africa. The modern world, however, moves fast, and a revolution, which took a thousand years in the old days, will in our crowded world be accomplished in a hundred years. The following remedies have suggested themselves to me :—

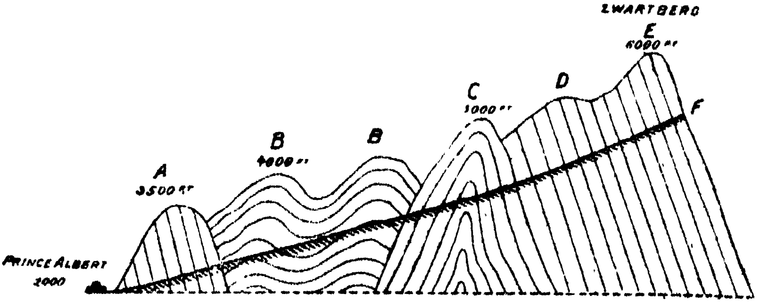


If the above represents a Karoo farm, it would be possible to divide it into three sub-divisions, A, B and C, by single wire fencing cutting across the dry stream and depressions. The flocks of sheep and goats would invariably be driven across the drainage of the country, and so make tracks which would rather help to conserve the water than to encourage it to course down the slopes. This utilisation of the sheep and goats to make catchwater drains would be encouraged by the collection of stones athwart the smaller streams at intervals. In the midst of these stones, acacia and willow seeds and seedlings would be gradually encouraged. Everything would be done to stop the water from getting a head on. What is easy of accomplishment at the source of a stream is a difficult engineering feat lower down the course. Having divided one farm into three compartments, one might be reserved for winter feeding, one for summer feeding, and the third for the renovation of the good Karoo bushes, and the extermination of the harmful and useless ones. Every third year, one compartment would be reserved for renovation. In this year the bad shrubs would be rooted out and the seed of good plants sown in the soft soil. Protected for a year from sheep and goats the young plants would have a chance of starting into life. I only make these suggestions in their rough outlines, leaving the experienced farmers to give them that direction which their own knowledge suggests. The Government, however, on its properties might make experiments and finally discover the best way to preserve these valuable Karoo plants, which, if left to themselves, will surely be exterminated. If the right method of preservation were adopted, it would probably be possible to feed three sheep where one can be fed to-day. These notes refer particularly to the Western Gouph.

(2). In the alluvium of the valleys acacias, tamarisks and willows would be encouraged, and in the damper localities tough grasses and oleanders. Every plantation would, however, be made athwart the stream. Where the alluvium has been swept away and a hard trough formed, advantage might be taken of the dykes to stretch wire netting across the streams and collect a few stones against them, so that they might catch the silt and grasses washed down in flood, and make resting places for the alluvium. Once alluvium was deposited, willow cuttings and acacia might be tried. Here and there it would even be possible to take advantage of a really good impervious dyke and construct a dam. If, however, it was desired to keep the reservoir free of deposit and prevent it from obliteration, I should recommend the construction of a low diversion weir in the main valley from which the water was to be taken and its conservation in a subsidiary valley with an earth and stone dam combined, some thirty or forty feet in height. The flood water to be stored in the reservoir would be passed over a wide stretch of alluvium and so deprived of its silt, and when clear and free of silt, it would be stored. Of the flood water in excess of that required to be stored, as much as possible should be used in an independent canal for direct irrigation, as such irrigation is especially profitable. All this may seem complicated, but in this world the really expensive things are the bad ones, and in a difficult country like the Karoo all cheap short-cuts will never prove themselves permanent. All dams constructed at well-chosen sites will naturally feed the subsoil springs, but to this subject I shall return later.

PRINCE ALBERT, 2,000 FEET ABOVE SEA-LEVEL.

At the edge of the Karoo, like an oasis in the desert, is situated the village of Prince Albert, with about 400 acres of cultivated land. The whole of this wealth is the creation of a small stream fed by a perennial spring in the Zwaartberg, which ordinarily discharges from one to three cubic feet per second, and is supplemented by occasional showers and one or two floods of a few hours duration per annum. The annual rainfall is some ten inches. The continuous irrigation percolates the soil and permits of a number of norias, worked by mules, and pumps operated by windmills. The water is raised some thirty-five feet.



The above is a cross section of the Zwaartberg Range at the Zwaartberg Pass. The stratification is some of the most extraordinary in the world, and has exercised geologists for generations. The rock is a sandstone, with belts of impervious clay. At A the rainfall is ten inches per annum, and thirty-two inches at F. The day we re-passed there were 1½ inches of rain and snow at F, and a few drops of rain at A. The rain must have been very local, as the Prince Albert stream had its discharge only increased from three to four cubic feet per second. On the south side of the Pass, between F and Oudtshoorn, the streams had their discharges trebled and quadrupled. Mr. Neethling, an intelligent and very enterprising farmer who owns many thousands of acres in Prince Albert, has carefully traced the line of an impervious dyke in the hills, struck it on his farm and spent £700 in digging a series of deep wells, connecting them by a horizontal bore, and erecting two windmills and a noria; and he is prepared to put up an engine and pump if the water continues as well as it promises. By acting thus he has probably doubled or trebled the value of his exceedingly well-cultivated holding. He insists that the stream loses 33 per cent. of its volume as it traverses the distorted rocks at B and the adverse dipping strata.

at A, and claims that the erection of an iron pipe from C to A would add greatly to the water supply of Prince Albert. If such proved to be the case the construction of a reservoir by a 250 feet high dam, somewhere between B and C, would probably quadruple the whole supply of the stream. Such a reservoir dam could be built very cheaply in the extraordinarily steep and narrow gorge by constructing it in the form of a circular arc, and employing the section adopted for the Sweetwater dam. The gorge is so narrow, and the strata so inclined, that an arch would be indestructible. In all these narrow gorges 250 feet high dams could be constructed without any misgivings. The rocks at C, D and E would give comparatively clear water at all times, the reservoir would be very long-lived, and would store enough of water in one year for tiding over the irrigation of two years.

THE OUDTSHOORN DISTRICT, 1,000 TO 1,500 FEET ABOVE SEA-LEVEL.

This district is the "Garden" of the Cape Colony. Lying between the mountain ranges of the Zwaartberg and Outeniqua, which catch three times as much water as the valley which lies between them, it enjoys a splendid climate and a splendid water supply. Every perennial spring of any magnitude is utilised to the utmost that I have ever seen water utilised. Take the Grobbelar River Valley for instance. This stream is fed by springs which rise in the Zwaartberg, and at the junction of the Grobbelar and Re Roux Rivers had a discharge of ten cubic feet per second the day we crossed it after long-continued drought. This discharge was utilised in the irrigation of 2,400 acres of cultivated land. The land was so thoroughly irrigated and saturated that the discharge of the Grobbelar's River near Oudtshoorn below these 2,400 acres was on the same day twelve cubic feet per second. The water was not so good as it was above, but still it was there, and was all that Oudtshoorn had for drinking purposes for scores of years.

The speciality of the valley is ostrich framing. There were literally tens of thousands of ostriches in the lucerne fields on the banks of the river. Alternate feeds of lucerne and veld bushes were considered beneficial to the birds. In addition to the lucerne fields the valley produced summer crops of tobacco and potatoes; while orange groves, vineyards and fruit gardens were everywhere to be seen. Not only were the perennial springs everywhere utilised, but the Oliphants River floods were utilised in a way I had not expected in South Africa from my previous readings. The Oliphants River traverses the whole length of the valley and has a mean width of some 600 feet and mean depth of trough of 15 feet. The fall of the river may be taken as seven feet per mile. The ordinary floods rise to four feet and eight feet, while extraordinary floods of 18 feet have been known. The river at every two miles or so was crossed by rough weirs of stone and shrubs, and canals were led off to irrigate the fields. The fall of the river was so good that it took a canal only one mile to 1¼ miles to begin irrigating flush.

The utilisation of the Oliphants River began, I was told, at its middle and lower regions, and here were situated the best farms in the valley in former times, but there is no irrigation department in the Cape Colony, and no idea of rotation of water supply, with the natural consequence that the farmers further up the river have gradually increased their weirs and canals in number, strength and size, and it has gradually come about that the best farms are now travelling up-stream, while the lower farms get only in ordinary times brack infiltration water turned three and four times through the soil, and the water of extraordinary floods. The ordinary floods are consumed before theyr each the lower farms—so we were informed—and so it appeared from the general look of decay ofthese lower farms.

At Calitzdorp, at the lower end of the valley, there is another magnificent stretch of flood irrigation from the Gamka River, and perennial irrigation from the Nels River. Judging from what I saw, there seemed to be some 70,000 acres of land in the Oudtshoorn Valley still capable of development by irrigation, if water could be found for them. Un-irrigated land in the Valley on which there falls annually from seven to ten inches of rain is worth scarcely £1 per acre, while the same land when irrigated is worth from £80 to £100 per acre. Irrigated land may be taken as worth £50 per acre without any exaggeration. In this valley many schemes are possible. The perennial streams such as the Nels, the Vley, the Wynands, the Grobbelar, and the Cango and the Komassie, could all have reservoir dams constructed on them which would store water without much fear of obliteration of the reservoirs through silt. The sides of the high hills where all the rain falls are either bare rocks or covered with dense bush (principally rhenoster) and send down clear water, which is very different to that in the Karoo streams. Before these works, with the exception of the Nels stream, could be carried out, however, it would only be fair to the proprietors on the Oliphants River below Oudtshoorn, who now get brack water ordinarily, and flood water only during extraordinary floods, to first ensure their getting a good supply before the surplus waters of the streams on which they depend were stored for utilisation purposes elsewhere.

The community might well imitate the example of the Moors in Spain on rivers similarly situated to the Oliphants. To do this it would be necessary to obtain an impartial engineer to level down the Oliphants River and fix the height of every weir. Each weir would then be built of concrete with an unchangeable crest. At the same time the floors of the canal heads would be fixed in size and height, and no subsequent variation would be permitted. In this way all would benefit. The lower proprietors would get a share of the low floods as well as the good floods. The higher proprietors would certainly be prevented from taking more than their fair share of low ordinary floods, but, possessing masonry weirs incapable of being swept away, they would not lose the waters of the good floods as they often do now by having their temporary weirs swept away when they would most like to see them preserved.

Once this were done I should recommend the construction of a diversion weir in the Karoo fed by the Gamka River. If a site could be found where the weir could be built of ordinary dimensions it should be built there, but if it could not, I should not hesitate to construct one of circular form 250 feet high in the narrow precipitous gorge of the Gamka opposite Calitzdorp, and lead the water from near its top across the Nelstream and over the Gamka flats, tailing into the Wynands River at its tail. This canal would irrigate some 30,000 acres and should have a section of 200 square feet. The whole of the earthwork excavation would be performed by American excavators, as Kaffir labour is out of the question. It would, for some ten years say, carry clear water which might be stored in the four uncultivated depressions cut across by the canal, and thus both store and irrigate. When the Gamka Valley had silted up and the canal begun to carry muddy water, the depressions would be crossed by iron pipes (care having been taken in the original construction of the canal to allow an ordinary fall of two feet per mile and some ten feet drop at each depression) which would carry muddy water for direct irrigation, while the water for storage would be led through basins where it would leave its silt and create some of the richest lands in the valley.

The Nels and Grobbelar River might then be carried out by building arched dams across the ravines and taking them up to 250 feet in height at suitable points where no valuable farms would be drowned out. Subsequently the Meiring's Gorge might be treated like the Gamka River. Here we have to deal with a silt-laden Karoo stream traversing a perfect gorge for dam construction. If 70,000 acres are worth £3,500,000 in the Oudtshoorn Valley the State should feel no hesitation in spending £2,000,000 on bold irrigation schemes, and being prepared to sell its water just as it sells its railway tickets. In such projects the State differs entirely from irrigation companies in that it benefits, not only from the direct sales of water, but from all the indirect returns which developed wealth pours into its coffers.

I may note here that with a dam 250 feet high, delivering the water for the direct irrigation of the Valley with a fall of 200 feet, there would be developed 200 h.p. for each ten cubic feet per second discharged. This power would be available for electric lighting or manufactures.

NORTH-EASTERN KAROO, 4,000 FEET ABOVE SEA-LEVEL.

This tract lies to the north of the Nieuwveld Mountains and their continuation towards the Zuurberg Ranges and Stormberg Ranges. The rainfall ranges between seven and nineteen inches per annum, and has a mean value of some eleven inches. The Karoo shrubs are far more plentiful than what they are in the Prince Albert District and of better quality. The same remark applies to those parts of the Beaufort West District which are near the Nieuwveld Range. This superiority is specially marked where there are lime deposits and concretions in the soil in moderate quantities. These concretions are deposits resembling the nedular and block Kunker of India. They are generally nearer the surface and of greater thickness. The Kunker in clay soil is generally accompanied by brack. When the soil is anywhere over a foot in depth the Karoo bushes are accompanied by the lighter grasses, such as the stick grass. When the undulating ground gives place to the flat vales where water stands after rains, the Karoo bushes are entirely supplemented by valuable vale grasses. It is a common remark both here and in the Eastern Province that where the grasses are eaten down every year by stock they are steadily improving. This improvement is more marked in the grasses which are completly eaten down and not burnt. Where, however, the grasses are annually eaten as far as possible and then burnt they are not so good as those only eaten down, but still they are vastly better than the coarse grasses of fifty years ago. This improvement of the grasses is in exact contradiction of the Karoo bushes. It is a matter of common observation that the flooding of Karoo lands with muddy water results in the extermination of the Karoo bush and its place being taken by the vale grasses.

The Nieuwveld Range and its continuation, the Zuurberg and Stormberg, all consist of sandstone hills, with horizontal strata overlying dolerite. The sandstone hills themselves are composed of alternate strata of a generally weak sandstone and of crumbling shale and clay. The strata of shale and clay are of much greater thickness than the strata of sandstone. The dolerite is generally very much decayed, though strong dykes of hard rock are everywhere encountered. Where the mountains disappear and the Karoo formation proper begins, we generally meet with undulating ground composed of shale or clay, with the Kunker nearly everywhere present. Through the undulating plains protrude the dolerite hills in the shape of parallel dykes, running generally North and South, with cross dykes at intervals. These dykes are everywhere traversed by the rivers and streams at low passes and gates.

Wherever a dyke is cut through a spring is generally found. Some of the springs are perennial; others only live for a few days after rain. The rivers and streams run only for a few days after rain, and are simply torrents. A perennial spring, discharging from three to four cubic feet per minute in the dry season, is considered a good spring. Such springs irrigate about five acres per cubic foot per minute. In some cases, as at Britstown, we may see as much as seven acres irrigated per cubic foot per minute, but five acres is the average. This is a considerable feat in a country with such a scanty rainfall, but as each spring has attached to it a tank capable of impounding about 10,000 cubic feet per minute of discharge (*i.e.*, a seven days' supply of the spring), and the impounded water is discharged quickly over the area to be irrigated, it is possible to make the water go far. The springs are generally strengthened by artificial reservoirs constructed up-stream of the springs. These reservoirs have earthen dams about ten or fifteen feet high and from 500 to 800 feet long, and hold up from five to eight feet of water.

The dams have generally a top width of five feet and slopes of one to one and a-half. They are pitched with stone on their up-stream faces. They contain from half a million to a million cubic feet of water when full. They completely dry up in the dry season, but catch all the rain whenever it falls and considerably strengthen the springs.

Very often one meets earthen dams and reservoirs where there are no springs, but these are for watering stock. They contain filthy and polluted water when nearly dry, and in years of scanty rainfall are putrid before they disappear altogether. Rinderpest and many of the ills from which stock suffer may be traced to these sources of pollution, as well as to the poverty of the stock themselves. Indeed, severe drought and rinderpest seem to go together. In all the advanced farms to-day stock are watered from tanks fed by subsoil water raised by windmills. These windmills are quite a feature of the country on advanced farms, and might, wherever there are no permanent springs, with advantage be made compulsory. No farmer should have the right to water his stock at filthy pools, which might possibly cause his cattle to contract disease, and then spread it all over the country. I have seen stock drinking from shallow pools which contained mud rather than water, and in which dead sheep were festering. It might be possible to legislate that, if a reservoir is constructed, it must be fenced round and protected from entry by stock. The reservoir dam should be pierced by a pipe discharging into a trough, from which cattle should be given drink. This would protect the water from pollution.

As the water entering all these impounding reservoirs is, as a rule, very muddy, there is a considerable amount of silting up, and indeed most of the reservoirs I saw had silted up from one-third to one-half of their contents. I was informed that in the dry season, when the reservoirs were dry, it was a simple matter to plough up the bed-sand and with a scraper scrape the reservoirs clean. I do not remember having seen a single reservoir which had been treated in this way, though I saw many which had nearly silted up to the tops of the dams.

The farms have a general area of some 12,000 acres each, with about twelve acres of cultivated land per farm. This means about one acre of arable land to a thousand acres of pastoral land. The cultivated plots attached to the farmhouses contain about an acre of fruit and vegetable garden, and some ten or twelve acres under wheat, Indian corn, lucerne and oat-hay. Wherever the farmers have planted willows and poplars round their reservoirs and along their springs and tanks, and have fenced in their gardens and cultivated plots, the farmsteads have an appearance of comfort and attractiveness which is very refreshing as one journeys through the veld.

In these Districts I was informed that the veld could carry one sheep or goat to four acres, or one ox to sixteen acres. The sheep were principally merinos, and the goats angoras.

(To be continued.)

HORTICULTURE.

Woodiness of the Passion Fruit.

Mr. A. Despeissis writing to the Journal of the Department of Agriculture, West Australia, about a disease hitherto unknown in that Colony, refers to the havoc it has played with the passion fruit plantations in New South Wales. Any Australian fruit of this species that may be imported to South Africa should be overhauled, for Mr. Despeissis says large quantities of the diseased fruit have already been dumped at West Australian ports from the Eastern State. Several illustrations of the "woody" disease referred to accompany Mr. Despeissis' notes and are reproduced here. They are taken from a paper on the subject prepared by Dr. N. A. Cobb, Government Vegetable Pathologist of New South Wales. Mr. Despeissis says: The cause of the disease is still obscure. First observed around Parramatta some seven or eight years ago it has since spread to the whole surrounding district. It is eccentric in affecting most of the vineyards in the locality named but actually allowing some plants in a diseased vineyard to go scot free. The disease is less common on moist free soil suited to passion fruit than elsewhere.

SYMPTOMS.

A "woody" passion vine is stunted in growth, with short distorted canes, of pale-yellowish leaves instead of a dark-green colour. The stocks are sometimes enlarged and knobby; much of the fruit drops early, the rest hang on, become distorted, crack on the surface, and when cut open are either empty and show a considerable thickness of the rind, or what there is of the edible pulp is thin, has a "flat" taste, with a colour different from that found in healthy fruit. The seeds do not ripen properly, and remain light and sometimes glassy instead of turning black.

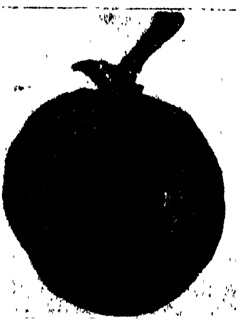
A woody Passion Fruit nearing ripening, showing cracks in the rind.

A diseased passion vine often shows amongst woody fruits some which have every appearance of soundness, and yet seeds from these apparently sound fruit contain in them germs of the disease which, when sown, they transmit to the resulting plants.

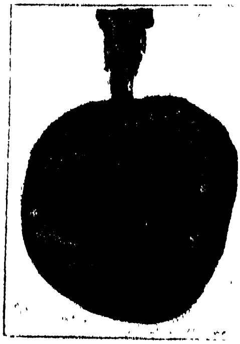
Exposed situations and frosts are also known to have a prejudicial influence on passion vines showing a tendency to woodiness, but, above all, exhaustion of the soil seems to accompany in most cases the woody disease.

The passion fruit plant is most exacting on the store of plant food in the ground. By reason of its rank growth and its prodigious bearing capacity (it bears two to three crops of fruit each year) it soon exhausts the soil of nourishment as well as of moisture. It has been noticed that, where manured, the vines are less affected by the disease than are vines growing alongside which have been stinted of fertilisers.

Dr. Cobb has observed on the yellow spotted leaves of diseased plants, as well as on the spotted bark of dead branches, a specific fungus which he believes to be associated with woodiness of the passion fruit.



Diseased fruit, little commercial value, such as shipped abroad. The seeds would germinate and propagate the disease.



Diseased Passion Fruit. The pulp would have a "flat" flavour, and the seeds would not germinate.

REMEDIES.

The passion vine is a gross feeder. According to Mr. F. B. Guthrie's computation, each passion vine with fruit removes on an average annually from the soil 6¼ oz. nitrogen, 1½ oz. phosphoric acid, and 2¾ oz. potash; so that a vineyard planted with 300 (12ft. x 12ft.) passion vines to the acre would remove: nitrogen 117 lbs., phosphoric acid 28lbs., potash 52 lbs.

Knowing that sulphate of ammonia of commerce contains about 20 per cent. of nitrogen, superphosphate about 14 per cent. phosphoric acid, and sulphate of potash of commerce 50 per cent. of potash, we arrive at the following mixture in order to restore to the land all the elements of plant food extracted by passion vines, and by a crop of passion fruit, viz :—

Sulphate of Ammonia	600 lbs.
Superphosphate of Lime...	200 lbs.
Sulphate of Potash	100 lbs.

Such a mixture applied at the rate of 3lb. per vine would cost 4d. per vine or a little over. It should be applied a year or so after the vines are planted.

Besides a liberal application of chemical fertilisers it has been suggested that considering the woody disease is propagated by means of diseased seeds, and moreover that in all attacked vineyards there are some vines which always look healthy and appear to be proof against the blight, cuttings be taken from such vines and planted with a view to obtaining passion vines endowed with the immunity of the parent.

On the Selection of Stocks for the Orange in the Southern United States.

Notes by Mr. Henry Meyers, Nurseryman, Newlands.

In Prof. MacOwan's resumé of the recently published U.S.A. Bulletin on the Relative Merit of Various Stocks for the Orange, in the *Journal* dated December 19 and January 2, almost one of the first sentences reads "but it is hard to grow wise by the experience of others." I think we might also add dangerous, if that experience is gained from oversea only and applied to this Colony, even if the experience is almost universal, for this reason;—The Seville stock has been tried both in the Eastern and Western Provinces, and in some cases on a large scale, by practical and intelligent nurserymen, and has not proved the universal success that the article would give one to expect.

Some eight years ago, when I started nursery work on citrus, I was guided by similar articles to this that were appearing at that time in the *Journal*, unfortunately at great loss to myself. I do not blame the Editor of that time, as he gave to the farmers of that date the best information available; no experiments on the Bitter Seville as a stock having then been made in this Colony. Since then it has been tried by several nurserymen.

My own experience is in practical working. Taking varieties haphazard, only about 33 per cent. thrive well on it, and for those I should certainly advise the Bitter Seville. In about another 20 per cent. the buds will grow and the junction appears perfect, but the after growth is very disappointing; they simply exist, making no growth more than a few inches of yellow blossom-laden twigs every year. In the remainder, a very small percentage of the buds take, and those make little or no growth.

I have had reports from those to whom I have sold trees, and as far as growth after setting out is concerned, my experience is confirmed. Some nurserymen may have had more success, but if so it has been through the varieties they chanced to work with. I have worked with and proved between 40 and 50 varieties on the Seville.

I could not afford to give away the result of my experience gained at so high a cost of many failures; at the same time I should like this to appear in the *Journal* so that it may prevent others from suffering the same loss that I have, and this I feel assured they would do if they were led by the article referred to.

There is a probability that the sour stock of Florida is not identical with the Citrus Bigaradia or Bitter Seville; hence our failures. I have had seed from Spain, Portugal, as well as that grown in the Colony, and the result was the same in all cases. As this is a matter of great importance both to the nurseryman and orchardist, I think that the Government Fruit Expert should give us his advice, as he must have seen the result of the Seville stock in his travels through the Colony; also that those growers who have used it in the Colony should be invited to confirm or refute my opinion.

MISCELLANEOUS.

More about Paspalum Dilatatum.

Mr. C. J. Booker of Queensland has been visiting Natal, having accompanied a shipment of his prime cattle which are believed to be immune from Redwater, or Tick Fever as it is termed in Australia. He was interviewed by the Editor of the *Natal Agricultural Journal*, and being asked his opinion about Paspalum Dilatatum was very emphatic in its praise. He said:—

It cannot be boomed too much. In our dairy districts it is being largely sown, and is recognised as the best of fodders for dairying. Large areas are being put under this grass in the districts of the Clarence, Richmond and Tweed Rivers—the great dairy districts of New South Wales. There is nothing like it in Australia. The seed is difficult to get. Mr. Jackson, Wollongbar, via Lismore, New South Wales, is a large grower of the seed, and I believe the quality of what he sells can be relied on.

"Four years ago," writes "J.K.Z." in the *Queensland Country Life*, "I sowed my first seed and also planted a few thousand roots to form a seed bed. My farm is now practically sowed with paspalum, and the more I see of it the better I like it. Of course I mix other grasses and clovers as a change for the stock, but paspalum is the basis of the pasture; it has proved itself a mainstay for the stock, growing vigorously when the fierce heat had withered up the other grasses. I have carefully observed it in all stages and variations, and I have come to the conclusion that paspalum dilatatum is the very best grass for the farmer to rely upon as a permanent pasture. I say permanent advisedly, for after four years' grazing the paddocks are still improving and giving an increased quantity of feed. It is with us carrying a beast to the acre all the year round, and yet, during this season, I have in rotation been able to shut up every paddock, allowing the grass to grow and shed its seed. By this method a perfect turf can be obtained; it does not spread from the roots and joints like some of the other paspalum grasses, of which there are great variety. It stands any amount of grazing, and the trampling of stock does not injure it. In this district it grows nearly all the year round, but naturally a little slower during July, August and September. It stands drought well, the frosts do not kill it, and I have cut it down and run a fire over it, and after this severe treatment it grew as vigorously as ever. There is nothing hard or wiry about this grass. It is soft and succulent, and there is no part of it from the crown to the seed heads that the stock will not eat. My observation of grasses has extended over many countries, as well as over most of the Australian States, but I have never met with any grass that would equal paspalum dilatatum.

I have no knowledge as to its value for sheep, but all other animals are fond of it, and keep up condition. Its qualities for dairying purposes are undoubted, and every cow is kept in such condition as to enable her to give her standard of quality in the milk produced. My average test at the milk separating station is amongst the very highest, ranging from 3.6 to 4.3 for butter fat. I have found the proper times to sow are—middle of July to middle of October, first week in December to first week in February. In the former it catches the spring rains, and in the latter the summer rains, both accompanied by heat, which appears very necessary. The quantity of seed to sow per acre varies with the requirements: 5 lbs. to 8 lbs. per acre on well-prepared ground will soon result in a good paddock. If 1½ lb. to 2 lb. per acre is sown, after grazing it should be held up about October, and allowed to grow and shed all its seed naturally. It will soon spring up, and the young grass, if anything like a favourable season takes place, will be fit to graze in May. I consider that allowing the grass to shed its seed naturally is the very best and surest method of thoroughly establishing the pasture.

As soon as the stalk begins to bend over, and attain a light greenish straw colour, is the time to commence picking. Deal very lightly with it or you will lose the best of the seed. The heads should then be taken into a barn and shaken. This shaking may be repeated two or three times next day, by which time all the matured seed will be obtained. In leaving the heads in heaps be very careful not to allow them to heat, or the seam will be spoiled. The heads may now for a day be turned and thrashed, and although the quality of seed obtained by this second manipulation is very inferior, still a percentage of it will germinate. It may be used, therefore, for thickly scattering over rough ground.

A great feature, too, in its favour is that it is not difficult to eradicate if a paddock should be required for cultivation. Ploughing alone would not do it, but by cultivation and bringing the plants to the surface, rolling and harrowing to free the roots from the soil, it quickly dies by exposure to the sun. It is very tenacious of life if soil should be left on the roots, especially in wet weather, but it does not grow from pieces of root like couch and some of the peas, but given plenty of cultivation and stirring, and a few fine days, and the trouble is over.

When the plants are far apart the grass grows into big tussocks, but as soon as the spaces are filled up it forms quite as good a turf as any of the other grasses.

There can be no question as to its being an invaluable grass, and it is now being eagerly sought for in this district since it has passed the stage of experiment."

Mr. Wm. Adams in the *Natal Agricultural Journal* gives the following information respecting his experience in the propagation of

PASPALUM DILATATUM.

Plot No. 1, 6 x 3 yards.—Ordinary soil, no manure, was forked over and made fine. The seed was broadcasted (October, 1901) and raked in; much of it remained exposed, but it came up freely, and is now 6 to 8 inches high, but it is so mixed up with a grass, which comes up on all cultivated soil, that it is impossible to tell which is which until it seeds.

Plot No. 2, 4 x 8 yards.—Finding the method of broadcasting on plot No. 1 unsatisfactory, I determined to sow in drills about nine inches apart. I formed these drills with the back of the rake, giving it a backward and forward as well as a dragging sideway movement in the direction of the lines at the same time; this made the drills about ½ inch deep; the seed was then sown and covered carefully over with the teeth of the rake and patted down along the drill with the back. These seeds came up well. I enclosed specimen of plant taken up this morning. The plot was sown in November, 1901.

Plots Nos. 3 and 4, 4 x 3 and 6 x 4 yards.—These were sown in the same way as plot No. 2 with the addition of fine bonedust in the drills, below the seed; the seeds in both these plots came up as thick as possible, touching each other, and are growing as much as the small wingless grasshopper will allow it to do. These plots were sown latter end of November, 1901. Anyone who has yet to sow this seed will perceive the advantage of doing so in drills, as the other grasses and weeds can be pulled out and you can see how it is progressing.

Argentina.

THE WOOL CRISIS—THE CONSEQUENCE OF THE RUSH INTO CROSSBREDS.

As shearing approaches the eyes of Argentine wool-growers are more eagerly than ever, if that were possible, turned towards the prospects of wool, and well they may be, as the wholesale collapse in the value of the mass of wool grown here is simply a national calamity. Stock farming has always been the backbone of the country, and the present state of the wool market, coupled with the closing of British ports to Argentine live stock, has utterly disorganised the industry. In 1881 the sheep of the Republic may be said to have been of an almost uniform quality—a degenerated Merino type—giving a fleece averaging 3 to 4 lbs., and the wethers a live weight of barely over 110 lbs. Long combing wool was then just coming into favour, and it was realised that, instead of boiling down the fat sheep, they might, if a bigger carcase were obtained, be exported with great advantage, dead or alive.

The Lincoln breed was found to combine the two requisites—wool and carcase—consequently a general rush was made to get into Lincolns. No attention was paid to the extraordinary variety of climate, soil and grasses existing over the immense area involved. No thought was given to the possibility of a change in fashions in the woollen trade. Everyone, with few exceptions, launched into Lincoln rams, good, bad and indifferent. The work of crossing was most diligently pursued, with the result that after twenty years three-quarters of the sheep of the country are crossbred Lincolns.

WILL THE LINCOLN CROSS BE GIVEN UP?

Argentine sheep farmers stand aghast at the prospect before them. They find themselves the owners of a breed of sheep of fine carcase, the wethers averaging at 4-teeth 10 lbs. more than under the old Merino régime, say, almost 135 lbs. live weight, but growing a wool that is an absolute drug in the market, worth in Buenos Aires to-day from 3½d. to 4½d. per lb. Such prices spell ruin to the unfortunate tenant-farmers, very many of whom are Irishmen, especially as they, as a class, persistently refuse to move up country, or "outside," as we term it here.

Our sheep farmers have certainly a most bewildering problem set before them. They must either be content to go on breeding their present Lincoln type, trusting to a change in its favour in the home markets, or set to work to rear an entirely different class of sheep. In fact, we are at a complete standstill, and are awaiting a leader to show us what to do. Go back to the old Merino we cannot, since their feet will not stand the wet lowlands, so plentiful here in the south of the province of Buenos Aires, and the lambs are too delicate for our rough-and-ready style of farming, especially as the lambing comes, as a rule, during the winter months. Besides, their carcase does not fulfil the requirements of refrigerators, or meet the market for imported live stock, should we again be able to resume export. The Lincoln, too, are credited now with a weak constitution, as there is no doubt that they become very small-boned and rickety, especially on our northern lands. But here we must explain how the question of constitution particularly appeals to us.

"WORMS."

This disease, which consists of millions of small threadlike worms, filling first the stomach and then the lungs, liver, and every part of the inside of the animal, has assumed such formidable proportions that many farmers have had to relinquish sheep altogether and turn to cattle breeding, or actually start in non-agricultural business. For years it has been with us, but usually in old days only appearing after wet summers and in certain restricted parts of the country. Now it is endemic, if we may use the expression, and is a more serious menace to the sheep of the country than any or all the other diseases or obstacles from which our sheep industry can suffer. Worms have assumed the proportions of a national disaster, and were matters allowed to continue as at present, immense tracts of country would have to be abandoned by sheep farmers. All cures and specifics have proven useless, except such expensive medicines as ammonia, and then the sheep have to be dosed continuously.

The cause is, probably, over-stocking. Sheep were found to be more paying than cattle, and sheep consequently were alone stocked on the land.

No permanent cure for worms—that is, from one or two doses of specific—has been, or is likely to be discovered. Prevention is far better. The infected pasture lands must either be ploughed up or only cattle must be fed on them. To the small tenant-farmer neither is practicable, since ploughing means the investment of capital not immediately productive, and he probably knows nothing of cattle. If the disease continues, as it must, we fear, the present organisation of the sheep industry must be totally altered. I cannot help thinking that our excessive rush wholesale into Lincolns has something to do with the spread of the disease. It looks very much as if we should have to discard them almost entirely for the black-faced breeds and Romney Marshes.

THE "IDEAL" SHEEP.

Your experiments in forming a new breed of Lincoln crossed with Merino is viewed with great interest by a few of us here, but we think that, though your theory is sound, we can improve on it in practice. We mean that Shropshire or Romneys might be substituted with advantage for Lincoln when crossing with Merino. It is surprising that you have not done something in this regard yourselves; perhaps you have, but the news has not reached Argentina. On low-lying, marshy lands, such as we have so much of, the Shropshire feet would suffer, and consequently Romneys would be preferable, but in the warmer districts, and on high, dry lands, the Shropshire cross should give better results both for wool and early maturity. Shropshires are superior also to Lincolns as mothers, and here they are actually said to improve in size and constitution, if that were possible.

Up to the present day absolutely no breed but Lincolns has been tolerated this side of the Paraná, though across the water, in Entre Rios, Corrientes, and the Republic of Uruguay, both Shropshires and Romneys have many adherents.

New Zealand sent us some very nice but rather small Lincolns, which have done very well here.

One very enterprising Argentine wool-grower, Manuel José Cobo by name, has spent a royal fortune on breeding Lincolns. Twice has he paid 1,000 guineas for a ram in England, and this year he is said to have 1,300 pedigree, pure-bred rams for sale. Three or four, nay, two years ago these animals should have been worth on an average from £15 to £20 apiece. We much doubt if he could realise half these prices to-day. In fact, we believe they are practically unsaleable at much less.

LETTER FROM ARGENTINE CORRESPONDENT TO *Pastoralists' Review*.

Artificial Manures.

The annexed list showing the agents from whom the various artificial manures may be obtained, and the current prices, is publiseed for the information and guidance of agriculturists.

Full particulars as to the composition of the respective fertilizers can be obtained on application to the agents; and attention is also invited to the analyses published in the *Agricultural Journal* of 9th January, 2nd April and 11th June, 1896; 30th Sept., 1897; 27th Oct., 1898; 13th Agril, 6th July, 1899 and 18th July, 1901.

LIST OF FERTILIZERS.

Attwell & Co., Cape Town. (Agents for Alex. Cross & Sons, Ltd., Glasgow.)	Special Root Guano .	£6	10	0	per ton of 2,000 lb,
	Potato and Grain Guano .	8	5	0	,, ,,
	Nitrate of Soda .. .	12	0	0	,, ,,
	Superphosphates 39/40 per cent ..	6	0	0	,, ,,
	Scotia Basic Slag (cont. 30 per cent. Tribasic Phosphate of Lime)	4	15	0	,, ,,
	Sulphate of Ammonia ..	0	19	6	per 100 lb.
	(Prices free on trucks, Cape Town)				
Jas. Searight & Co., Cape Town.	No. 1 Superphosphates .. (containing 12·14 per cent. Phosphoric Acid soluble in water, being equal to 26·80 per cent. Tribasic Phosphate of Lime). ..	£5	0	0	per ton of 2,000 lb.
	No. 2 Superphosphates ..	5	10	0	

Jas. Searight & Co., Cape Town.	(containing 14·16 per cent. Phosphoric Acid soluble in water, being equal to 30·35 per cent. Tribasic Phosphate of Lime). ..	
	No. 3 Superphosphates ..	£6 0 0 per ton of 2,000 lb.
	(containing 17·18 per cent. Phosphoric Acid soluble in water, being equal to 37·39 per cent. Tribasic Phosphate of Lime). ..	
	Vine Fertilizers	9 0 0 ,, ,,

A reduction of 5s. per 2,000 lbs. is allowed on orders of 100 bags or more. Special rates can be arranged if delivery is taken ex importing steamer, the goods being trucked at Docks.

Woodhead, Plant & Co. Cape Town.	Thomas' Phosphate Powder ..	£4 15 0 per ton of 2,000 lb.
	Superphosphates	5 15 0
	Nitrate of Soda	14 0 0
	Muriate of Potash	16 0 0
	Sulphate of Potash	16 0 0
	Wheat Fertilizer	8 10 0
	Kainit	4 15 0
	Potato	1 15 0 per 200 lb.
	Vineyard Manure	1 15 0 ,,
	Tobacco Manure	1 15 0 ,,
	Sulphate of Ammonia ..	1 2 6 per 100 lb.

Subject to a discount for cash.

De Waal & Co., Cape Town.	Jadoo Fibre	10s. 6d. per bale of 100 lb.
White, Ryan & Co., Cape Town.	Potato, Vegetable and General garden	£8 10s. per ton of 2,000 lb. If less than ½ ton 18s. 6d. per bag of 200 lb.
	Pure Ground Bone	£6 10s. per ton of 2,000 lb. If less than ½ ton 13s 6d. per bag of 200 lb.
White, Ryan & Co., Cape Town.	Quick-acting Bone and Potash Mixture	£7 per ton of 2,000 lb. If less than ½ ton 16s. per bag of 200 lb.
	Selected Bone Meal for Cattle, Horses, Pigs and Poultry ..	15s. 6d. per 100 lb.; special price per ton.
	Bone Grit for Fowls ..	12s. 6d. per 100 lb.
	Superphosphates ..	Wholesale only.
Malcomess & Co., E. London.	"Malcomess" A. Fertilizer, for Potatoes, Mealies, Vegetables, Orange and other trees ..	£9 per ton of 2,000 lb.
	"Malcomess" B. Fertilizer, for cereals, especially wheat ..	£9 per ton of 2,000 lb.
	Accompanied by guaranteed analysis by Prof. Hahn ..	(less 5 per cent for cash).
James Flower & Sons, Cape Town.	"H.B.T." Gypsum	£3 10s. per ton of 2,000 lb.
	Pure Ground Bone Meal ..	£8 10s. ,, ,, (in bags f.o. trucks—Cape Town).
Government Guano :—	Ordinary Guano	£6 10s. per ton of 2,000 lb. or 13s. per bag of 200 lb.
	Rock Guano	£6 17s. per ton of 2,000 lb. or 13s. 9d. per bag of 200 lb.

For use within limits of Colony.
Price includes delivery at Cape Town Railway Station.

GOVERNMENT NOTICES.

Farmers' Apprentices. Dairy Assistants, &c.

As inquiries are from time to time received from young men from abroad as to where they may serve apprenticeship or gain practical experience of farming in this Colony, before starting on their own account, the Secretary for Agriculture invites Farmers who are willing to receive young men of good character, for this purpose, to register their names with the Under Secretary for Agriculture, stating the class of farming they do, how many young men they are prepared to take, and for what period they would enter into an agreement.

It is not probable that these young men will be in a position to give more than their free services in return for the experience they will gain; that is, they will not be able to pay any fee; and they will look to receiving free board and lodging in return for their services.

It is to Farmers, therefore, who are willing to grant such young men free board and lodging in return for services rendered, that this application is especially addressed.

With reference to the above notice to Farmers, the Secretary for Agriculture now invites young men who are willing to engage themselves as Farmers' Apprentices in Cape Colony to register their names with the Under Secretary for Agriculture, Cape Town. The apprentice will gain experience in farming in South Africa, and have an opportunity for spying out the land before starting on his own farm. To the new comer from another country this is essential, for he has much to learn and unlearn.

Many applications for such Apprentices have been received from Farmers in the Colony. It will be noted that the Apprentice will neither receive wages, nor pay a fee. He will get free board and lodging in return for his services, and at the same time acquire the experience he is in need of.

Applications for employment have also been received from several Lady Dairy Experts and Dairy Assistants; and Dairy Farmers and others desiring to avail themselves of the services of such are invited to register their names with this Department, giving particulars as to situation and extent of operations, etc., and salary and other emoluments they are prepared to offer.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM BASUTOLAND.

By command of His Excellency the Governor, the following Proclamation No. 164, 1901, was published in the Government Gazette of October 29th, 1901:—

Whereas by Proclamation No. 100, bearing date the 4th day of June, 1901, I did, by reason of the existence of the disease amongst cattle known as Rinderpest in the Territory of Basutoland, prohibit the introduction of horned cattle from the said Territory into this Colony:

And whereas the said disease has spread to the portions of this Colony which adjoin the said Territory, thus rendering it unnecessary to longer maintain the prohibition imposed by the said Proclamation:

Now, therefore, under and by virtue of the powers and authorities in me vested, I do hereby proclaim, declare and make known that from and after the date hereof the prohibition upon the introduction of horned cattle from Basutoland into this Colony shall be removed: the said Proclamation No. 100 of 1901 being hereby repealed accordingly.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM ORANGE RIVER CO AND THE TRANSVAAL.

By command of His Excellency the Governor, the following Proclamation No. 189 1901, was published in the Government Gazette of August 16th, 1901: —

Under and by virtue of the powers vested in me by the "Animal Diseases Act," No. 27 of 1893, and by the "Animals Diseases Rinderpest Amendment Act," No. 2 of 1897, I do hereby proclaim, declare and make known that it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced into any part of this Colony from the Orange River Colony and the Transvaal, save and except such cattle as may be required to be introduced by the Government for the purpose of supplying Bile or Serum for inoculation against Rinderpest:

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed

And I do hereby further declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

Proclamation No. 217, bearing date the 29th day of October, 1900, together with the regulations issued thereunder, is thereby repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined Regulation for checking the spread of the infection is republished.

REGULATION ISSUED UNDER PROCLAMATION No. 30, DATED 20TH JANUARY, 1899.

Whenever under the provisions of Sections 11 and 12 of Act No. 27 of 1893, any area is declared or proclaimed to be an area infected with Rinderpest, it shall not be lawful for any person, animal, animal produce, article or thing, who or which may, in the opinion of the Magistrate of the District in which such area is situated, be liable to convey infection of Rinderpest, to leave or to be removed therefrom.

Inoculation Against Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of the Colony, it is desirable to inform stock-owners of the intentions of the Government as to dealing with the outbreak should it unfortunately become general in the Colony, and to advise stock-owners as to the best course to follow.

The Government propose that, as a general rule, cattle-owners themselves should perform the inoculation. Glycerinated Bile will be used, though circumstances may arise where it will be preferable to use Serum.

Bile Stations will be established in suitable places as necessity arises in localities where farmers have agreed to contribute the required proportion, say 5 per cent., of their cattle for production of the bile. It must be clearly understood that unless farmers are prepared to thus contribute the necessary cattle, it will be impossible for them to have the benefit of a Bile Station.

Glycerinated Bile will be issued free to contributors in proportion to the number of cattle contributed to a Bile Station. To non-contributors a fair charge will be made for bile if any be available for issue.

Serum will be charged for at the rate of £1 per bottle of ten doses.

A limited supply of Glycerinated Bile to meet emergencies will, for a time, be available, free of charge, from the Bile Station which has been established under arrangements with the Imperial Military authorities near Aliwal North.

As occasion requires, Demonstrators will be sent to instruct farmers in the method of inoculation, free of charge. They will, as a rule, inoculate only enough cattle to show how it is to be done, leaving the owner to continue the work. The Government will supply syringes on application to the Resident Magistrate, or to the Demonstrators at the following charges:--20 cc. capacity, 20s; 10 cc. capacity, 15s. This payment may be recovered on return of the syringe to the Magistrate, in good order.

After the experience gained during the outbreak of 1896-1898, the Colonial Veterinary Surgeon wrote* as follows:—

"The method of inoculation which I would recommend in future sporadic outbreaks of the disease is briefly as follows:—

"*Infected Herds.*—These should be inoculated at once with either serum or glyceri-
"nated bile; every animal which indicates infection by a rise of temperature should
"receive a large dose of not less than 100 cc. of serum, or 30 cc. of glycerinated bile;
"the latter should, by preference, be injected into the jugular vein, so as to secure its
"immediate action. Then from eight to twelve days after, all the animals in the herd
"which give no indication of being infected with the disease, or fever temperature,
"should receive an injection of pure bile; not less than 10 cc., and for large animals
"20 cc. This will confer a lasting immunity sufficient for all practical purposes.

"*Clean Herds.*—When it is decided to inoculate a clean herd, which is in danger of
"becoming infected through its proximity to diseased cattle I would recommend that
"the animals composing the herd should be inoculated first with 20 cc. of glycerinated
"bile, and to follow this inoculation in from eight to twelve days with an injection of
"from 10 to 20 cc. of pure bile. This will confer a strong and lasting immunity on the
"animals in the herd, and will be free from risk arising from the inoculation or of
"introducing the disease.

"*Use of Pure Bile.*—Pure fresh bile should not be used in an infected herd, if any
"of the other inoculating materials can be obtained, as it tends to intensify the
"character of the disease in those already infected, and its immunising effect is too
"slowly developed to protect the healthy cattle against infection, if they are left in
"contact with those already sick. If no other means are available, however, the
"temperatures of the whole of the cattle in the infected herd should be carefully taken
"by the clinical thermometer, and only those which register a normal temperature
"should be inoculated with pure bile, the others should be separated from the inoculated
"lot at once, and carefully tended. If glycerine can be obtained, the spare bile should
"be mixed with it in the proper proportions—one part of glycerine to two parts of
"bile. This mixture, after standing forty-eight hours, may be injected into the affected
"animals in large doses, not only with safety, but with marked benefit.

"*Preparing the Bile.*—The bile should be taken from an affected animal immedi-
"ately after death, or from one which is killed in the last stage of collapse.

"Biles of all shades of colour—except those which are red from the presence of
"blood—may be used, so long as they are clear and free from a putrid smell. Thin
"light yellow biles should also be rejected.

"All the galls extracted at one time should be mixed together, after standing sepa-
"rately for twelve to eighteen hours, so as to render them uniform in strength and
"immunising properties. Pure bile should be used on the second day after being
"drawn, unless it is kept in an ice chest, when it may be kept sweet much longer. But
"if pure bile is used as a second inoculation only, as above directed, it is not desirable
"to keep it longer than twenty-four hours.

"Glycerinated bile is made by adding one part of glycerine to two parts of bile, stir
"the mixture well, then mix all the biles taken at one time, and allow them to stand
"for eight days. But if there is urgency, the glycerinated bile may be used forty-eight
"hours after it is mixed.

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* See *Agricultural Journal*, June 8, 1899, in which will be found a full consideration of the different methods of inoculation.

"I would strongly recommend that in every outbreak of the disease that occurs, "every drop of suitable bile, obtained from the animals which die, should be mixed "with glycerine in proper proportions, two parts of the bile to one of glycerine, so that "it may be preserved and made available for the inoculation of infected herds, and also "for the first inoculation of clean herds which may be considered in danger. Pure "bile for the second inoculation of clean herds can always be obtained when the "disease appears in any locality, which would be the only reason for inoculating clean "herds in the immediate vicinity."

Taking the Bile. To remove the bile the animal must be laid on its left side, the skin and flesh on the right side immediately behind the last rib being cut through; the ribs being raised, the gall bladder will become visible. The gall bladder should be then punctured with a small knife and the gall allowed to escape into a wide-mouthed bottle. If wide-mouthed bottles are not available then ordinary whisky bottles may be used with an *enamelled* funnel, which can be procured at any country store. Every precaution must be taken that the operation is performed in a thoroughly clean manner, the hands of the operator and all knives, &c., being thoroughly cleansed before use.

Inoculating.—After having secured the animal to be operated upon, the necessary dose of bile is injected under the skin of the dewlap by means of a Hypodermic Syringe, care being taken that the point of the needle is not inserted into the flesh, but between the skin and flesh.

Symptoms of Rinderpest.

The Outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined description of the symptoms of Rinderpest is hereby published:—

The early symptoms of Rinderpest are a rise of internal temperature to 106 or 107° Fahr.; the animal stands with its head hanging down, ears drawn back and coat staring; it refuses all food and occasionally shivers. A mucous discharge flows from the eyes and nostrils; the extremities are cold, and the breathing is laboured and frequently accompanied with moaning. The inner part of the upper lip and roof of the mouth and all visible mucous membranes are reddened, and covered with an eruption of minute pimples, and later with a branlike exudation. The bowels are occasionally constipated, but in most cases diarrhœa sets in, the evacuations being slimy and very frequently of a dirty yellow colour. The prostration of strength is great, the animal staggering when made to move. In milch cows the secretion of milk is rapidly diminished, and soon ceases altogether. The disease usually ends fatally in from six to ten days.

It is generally believed that the infection is produced through the respiratory organs; from there the contagion becomes generalised. The contagion exists in the secretions and excretions, urine, saliva, mucous secretions of the nose, mouth and eyes, in the sweat, expired air, blood, and in all the tissues. It may be conveyed directly by the diseased animals, or indirectly by the dung, the bedding, the earth, hides, wool, meat, clothing, wagons or vessels, by people, dogs, sheep and chickens, &c. Contagion takes place only through short distances. When the weather is dry this is reduced to its minimum (about 27 yards), and the progress of the disease may be stopped by a ditch separating the diseased from the healthy animals.

In order to detect the earliest symptoms of Rinderpest, owners of horned cattle are warned of the urgent necessity for keeping a constant and close watch upon their stock. Any suspicious cases should be immediately reported to the nearest Resident Magistrate, Field-cornet or Police Officer, and the sick animal kept separate till an inspection is made. Stock should be carefully examined daily by a responsible person, more particularly for any symptoms resembling those above described.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October, 1900:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

- (*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and
- (*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie

Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B' hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung-sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz.:—

Number and general description of Cattle ....
Owner's name and address ....
In charge of..
Place to which Cattle are being sent........................
(Signature)..
(Address)..
Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature..
(Address)..
Date.....................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle
Owner's name and address
In charge of.......
Place to which Cattle are being sent..........
(Inspector's signature).

Date.

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be a follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	8	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*)	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	8

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Seed Wheat.

A small consignment of "Red Egyptian" Seed Wheat has been imported by the Government for experimental sowing with a view to ascertaining its suitability as a rust-resistant wheat as well as its milling qualities.

This wheat will be distributed in lots not exceeding 100 lb. to any one person, upon deposit of a sum at the rate of 10s. per 100 lb., and the amount so paid will be refunded to all those applicants who furnish a full report, upon a printed form which will be supplied to them, showing the result of the trial.

Applications should be addressed to the Under Secretary for Agriculture, Cape Town, and must be accompanied by a remittance (by P.O. Order, Postal Note, Bank Draft or Cash) for the amount of the deposit.

As the consignment is a small one, early application should be made.

Tobacco Seed.

A small consignment of the following varieties of Tobacco Seed, viz.:—White Burley Havana, Yellow Oronoko, Virginia "One Sucker," Virginia Pryor, Blue Pryor, Connecticut Seed Leaf, and Maryland, have been obtained from America by the Agricultural Department. Sumatra, Long Leaf Gooch and St. Felix are shortly expected.

Applications, accompanied by the deposit of 5s., should be addressed to the Under Secretary for Agriculture, Cape Town; and will be dealt with in order of receipt.

The seed will be distributed in lots not exceeding 3 oz. each of any three of the above-mentioned varieties upon deposit of the sum of 5s. by each applicant, which amount will be refunded by the Government to all applicants who furnish a report in due course, giving full particulars as to the mode of cultivation adopted and the results obtained.

RAINFALL, DECEMBER, 1901.

Note: n.r. denotes that, up to the date of publication, Returns have *not* been *received* from those Stations.

I. CAPE PENINSULA:	INCHES.
Royal Observatory—12 inch gauge	0·31
Cape Town, Town House	
Do. South African College	0·58
Do Sea Point (Hall)	0·34
Do. do. (Roseby)	
Do Molteno Reservoir	0·63
Do Platteklip	0·69
Do Signal Hill	0·33
Table Mountain, Disa Head	0·90
Do Kasteel's Poort	1·52
Do Waai Kopje	1·71
Do St. Michael's	1·55
Devil's Peak, Block House	1·48
Do. Nursery Gauge	0·92
Do. Lower Gauge	0·54
Rondebosch	0 81
Newlands (Montebello)	n.r.
Bishopscourt	0·72
Claremont (Sanatorium)	0·35
Kenilworth	0·33
Wynberg (St. Mary's)	0 34
Groot Constantia	1·55
Tokai	0·75
Simon's Town (Wood)	0·30
Do. (Gaol)	0·32
Blaauwberg Strand	0 23
Robben Island	0·65
Strandfontein	0·23
Camp's Bay	0·21
Fish Hoek	0 23
Cape Point	0·09
Smith's Farm	n.r.
Durbanville	n.r.
II. SOUTH-WEST:	
Eerste River	n.r.
Klapmuts	0·45
Stellenbosch (Gaol)	0·37
Somerset West	0·23
Paarl	0·41
Wellington (Gaol)	0·66
Do. (Huguenot Seminary)	n.r.
Weltevreden	0 69
Tulbagh	0·20
Kluitjes Kraal	0·00
Ceres	0·59
Rocklands	0·10
Caledon	0·18
Worcester (Gaol)	0·00
Do. (Meiring)	0·00
Do. (Station)	0·00
II. SOUTH-WEST—*continued.*	**INCHES.**
Hex River	0·04
Lady Grey (Div. Robertson)	0·07
Robertson	0·22
Do. (Govt. Plantation)	0·07
Montagu	0·00
De Hoop (Div. Robertson)	n.r.
Piquetberg Road	0·25
Ceres Road	0·00
De Doorns	0·00
III. WEST COAST:	
Port Nolloth	0 00
Do. (Howard)	n.r.
Klipfontein	0·04
Kraaifontein	0·00
O'okiep	0·06
Springbokfontein (Gaol)	0 08
Concordia	n.r.
Garies	n.r.
Kersefontein	0·16
The Towers	0·22
Dassen Island	0·20
Malmesbury	0·20
Piquetberg	n.r.
Van Rhynsdorp	n.r.
Clanwilliam (Gaol)	n.r.
Do. (Seydell)	0 02
Welbedacht	
Hopefield	0·08
Lilyfontein	n.r.
Zoutpan	0·13
Anenous	n.r.
IV. SOUTH COAST:	
Cape L'Agulhas	0·14
Bredasdorp	0·15
Swellendam	0·30
Heidelberg	0·10
Riversdale	0·11
Geelbek's Vlei	0·16
Mossel Bay	0·21
George	0·96
Ezeljagt	0·41
Millwood	1·88
Sour Flats	1·88
Concordia	1·72
Knysna	1·77
Buffels Nek	1·99
Harkerville	1·08
Plettenberg Bay	0·28
Forest Hall	0·7

IV. SOUTH COAST—*continued.*

	INCHES.
Blaauwkrantz	1·36
Storm's River	1·39
Witte Els Bosch	1·85
Humansdorp	0·66
Cape St. Francis	0·80
Hankey	0·37
Witteklip	0·98
Van Staaden's (upper)	n.r.
Do. (lower)	1.27
Uitenhage	n.r.
Do. (Inggs)	0·31
Dunbrody	0·00
Port Elizabeth (Harbour)	0·44
Walmer Heights (near Port Elizabeth)	0·87
Tankatara	0·00
Lottering	1·43
Shark's River (Nursery)	0·67
Do (Convict Station)	0·58
Grootvader's Bosch	n.r.
Karnmelks River	0·20
Armadale	0·06
Vogel Vlei	0·00
Great Brak River	0·47
Melkhoutfontein	0·11
Uitenhage Park	0·86

V. SOUTHERN KARROO:

Touws River (D.E's. Office)	0·06
Do. (Station)	0·02
Ladismith	0·00
Amalienstein	0·06
Calitzdorp	0·00
Oudtshoorn	0·00
Vlakte Plaats	0·00
Uniondale	0·00
Kleinpoort	n.r.
Glenconnor	n.r.
Triangle	0·00
Grootfontein	0·00
Pietermeintjes	0·00
Bok River	0·02
Verkeerde Vlei	0·00

VI. WEST CENTRAL KARROO:

Matjesfontein	
Prince Albert Road	0·00
Fraserburg Road	0·00
Prince Albert	0·00
Zwartberg Pass	0·10
Beaufort West	0·00
Dunedin	0·00
Nel's Poort	0·00
Camfer's Kraal	0·02
Lower Nel's Poort	0·00
Baaken's Rug	n.r.
Willowmore	0·00
Steytlerville	0·00
Roosplaats	n.r.
Laingsberg	0·00

VII. EAST CENTRAL KARROO:

Aberdeen (Gaol)	0·00
Do. (Bedford)	0·00
Aberdeen Road	n.r.

VII. E. C. KARROO—*continued.*

	INCHES.
Rietfontein	0·00
Winterhoek	0.00
Klipdrift, De Erf	0·00
Kendrew	0·00
Graaff-Reinet	0·00
Do. (College)	n.r.
New Bethesda	0·30
Roode Bloem	0·00
Wellwood	0·11
Do. (Mountain)	
Jansenville	0·00
Patrysfontein	0·43
Toegedacht	0·00
Klipfontein	0·00
Cranemere	n.r.
Pearston	0·00
Somerset East	1·50
Do. (College)	n.r.
Longhope	n.r.
Middleton	n.r.
Corndale (Div. Aberdeen)	n.r.
Cookhouse	n.r.
Doornbosch, Zwagershoek	n.r.
Middlewater	0·00
Darlington	n.r.
Glen Harry	0·00

VIII. NORTHERN KARROO:

Calvinia	n.r.
Middlepost	n.r.
Sutherland	n.r.
Rheboksfontein	n.r.
Fraserburg	0·00
Onderste Doorns	n.r.
Droogefontein	n.r.
Gannapan	n.r.
Carnarvon	0·13
Wagenaar's Kraal	0·00
Brakfontein	n.r.
Vogelstruisfontein	0·00
Victoria West	0·18
Britstown	0·00
Murraysburg	n.r.
De Kruis	n.r.
Richmond	n.r.
De Aar	0·01
Middlemount	0·00
Hanover	0·22
Philip's Town	0·31
Boschfontein	0·08
Petrusville	1·48
The Willows	n.r.
Naauwpoort	n.r.
Middelburg	0·26
Colesberg	0·14
Tafelberg Hall	n.r.
Rietbult (Colesberg Bridge)	n.r.
Stonehills	0·00
Cradock	0·09
Do. (Rose)	0·10
Varsch Vlei	n.r.
Witmoss	0.00
Steynsburg	0·5
Do. (Nesemann)	0·52

VIII. N. KARROO—*continued.*	INCHES.
Daggaboer's Nek	0.10
Quagga's Kerk	n.r.
Tarkastad	0·48
Drummond Park	1·40
Riet Vlei	0·59
Brand Vlei	n.r.
Omdraai's Vlei	n.r.
Zwagersfontein	
Varken's Kop	0·89
Culmstock	n.r.
Doorskuilen	n.r.
Houwwater Dam	n.r.
Hillmoor	0·28
Glen Roy	1·38
Fish River	n.r.
Spitzkop	n.r.
Phisantefontein	0·00
Biesjesdam	0·00
Kleinhaasfontein	0·70

IX. NORTHERN BORDER:	
Pella	0·40
Kenhardt	n.r.
Van Wyk's Vlei	0·00
Prieska	n.r.
Dunmurry	n.r.
Griqua Town	1·19
Campbell	0·93
Douglas	n.r.
Avoca (Herbert)	1·83
Eskdale	0·60
Hope Town	0 34
Orange River	n.r.
Newlands (Div. Barkly West)	2·24
Groot Boetsap	n.r.
Kimberley (Gaol)	4·92
Do. (Stephens)	6·09
Bellsbank (Div. Barkly West)	n.r.
Barkly West	4·10
Upington	n.r.
Trooilapspan	n.r.
The Halt	n.r.
Karree Kloof	0·45
New Year's Kraal	n.r.

X. SOUTH-EAST:	
Fairholt	1·56
Cheviot Fells (Bedford)	n.r.
Alicedale	n.r.
Bedford (Gaol)	0·60
Do. (Hall)	0·67
Sydney's Hope	0.51
Cullendale	0·27
Adelaide	0·08
Atherstone	0·18
Alexandria	0·37
	0·30
n's Town (Gaol)	0·48
Do. (Bact.Inst.)	0·44
Heatherton Towers (near Graham's Town)	0 00
Fort Beaufort	0·09
Katberg	2·49
Do. (Sanitarium)	1·62
Balfour	0·66

X. SOUTH-EAST—*continued.*	INCHES.
Seymour	0·00
Glencairn	1·13
Alice	0·05
Lovedale	n.r.
Port Alfred	0·42
Hogsback	1·57
Thaba N'doda	0·46
Peddie	0·00
Cathcart	0 92
Keiskama Hoek	0·00
Dynamite	0·64
Thomas River	1·36
King William's Town	0·16
Do. Hospital	0·35
Stutterheim (Wylde)	1·36
Do. (Besté)	1·28
Dohne	1·84
Kubusie	1·50
Blaney	n.r.
Kei Road	1·45
Evelyn Valley	2·88
Berlin	0·40
Isidenge	2·58
Perie Forest	1·47
Quacu Forest	2 82
Kologha	2·84
Fort Jackson	0·85
Komgha	1·71
Prospect Farm (Div. Komgha)	1·23
East London, West	0·59
Do. East	0·76
Fountain Head	0·51
Fort Cunynghame	2·14
Cuylerville	n.r.
Bolo	n.r.
Fort Fordyce	0·89
Exwell Park, Waku	0·65
Melrose	0·31
Sunnyside	0·46
Chiselhurst	0·73
Sterkspruit	7·29
Scott's Bottom	0·20
Dontsah	1·23
Wolfridge	0 82
Cata	1·31

XI. NORTH-EAST:	
Venterstad	0·72
Ellesmere	2·60
Burnley, Cyphergat	1·00
Burghersdorp	1·67
Do. (Le Roex)	n.r.
Molteno Station	n.r.
Cyphergat	1·36
Thibet Park	0·66
Sterkstroom	1·65
Do. (Station)	n.r.
Rocklands	1·12
Aliwal North (Gaol)	n.r.
Do. (Brown)	1·52
Rietfontein	1·86
Buffelsfontein	n.r.
Hex's Plantation	0·53

XI. NORTH-EAST—*continued.*	INCHES.
Carnarvon Farm	2·60
Jamestown	0·90
Queenstown (Gaol)	1·41
Do. (Beswick)	n.r.
Dordrecht	3·83
Tylden	1·50
Snow Hill	n.r.
Herschel	2·28
Lady Grey	2·40
Bolotwa (Contest)	1·95
Lady Frere	2·97
Avoca (Div. Barkly East)	n.r.
Keilands	1·37
Barkly East	3·11
Glenlyon	4·75
Lyndene	n.r.
Mooifontein	0·24
Poplar Grove	0·44
Biesjesfontein	n.r.
Whittlesea	1·15
Blikana	4·41
Doornkop	3·05
Halseton	2·97
XII. KAFFRARIA:	
Slaate, Xalanga	n.r.
Ida, Xalanga	n.r.
Cala, Xalanga	n.r.
Cofimvaba	n.r.
Nqamakwe	2·29
Main	8·10
Engcobo	2·42
Butterworth	1·04
Kentani	0·92
Maclear	n.r.
Idutywa	0·63
Willowvale	4·00
Mount Fletcher	4·15
Elliotdale	1·64
Mqanduli	8·35
Matatiele	n.r.
Umtata	4·08
Qumbu	4·51
Kokstad	4·01
Port St. John's	n.r.

XII. KAFFRARIA—*continued*	INCHES.
Umzimkulu	5.33
Woodcliff	n.r.
Tabankulu	n.r.
Kilrush	7·21
Somerville (Div. Tsolo)	4·10
Tsomo	2·08
Seteba	8·30
Flagstaff	6.49
Quebe ..	8·24
Insikeni	5·75
Bazeya	6·42
XIII. BASUTOLAND:	
Mafeteng	5·45
Mohalie's Hoek	4·88
Qacha's Nek	5·45
Moyeni Quthing	8·56
Teyateyaneng	4·03
Leribe	n.r.
Butha Buthe	n.r.
Maseru	1·77
XIV. ORANGE RIVER COLONY:	
Bethulie	0·43
Bloemfontein	n.r.
Smithfield	n.r.
Kroonstad	1·75
XV. NATAL:	
Durban, Observatory	3·89
XVI. THE TRANSVAAL:	
Johannesburg (Park)	n.r.
Do. (Cemetery)	n.r.
XVII. BECHUANALAND:	
Vryburg	2·47
Taungs	2·56
XVIII. RHODESIA:	
Salisbury	7·71
Hope Fountain	8·50
Geelong	9·49
Chishawasha	n.r.

OF AGRICULTU DUCE.

CENTRE.	A. Wheat per 100 lb.	B. Wheat. Flour. per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal per 100 lb.	F. Barley. per 100 lb.	G. Oats. per 100 lb.	H. Oat-hay. per 100 lb.	J. Potatoes per bag.	K. Tobacco (Boer Roll.) per lb.	L. Beef. per lb.	M. Mutton per lb.	N. Fresh Butter. per lb.	O. Eggs. per doz.	P. Cattle. (Slaughter.)	Q. Sheep. Slaughter.)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s d	£ s. d.
Aliwal North ...	0 15 0	0 17 0	0 12 6	0 10 0	0 11 6	0 10 0	0 12 0	0 10 0	1 1 0	0 0 11	0 0 10	0 0 10	0 2 6	0 2 3	£17 to £20	19/- to 20/-
Beaufort West ..	...	...	...	...	...	...	...	...	..	...	...	...	...	...	..	...
Burghersdorp ...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...
Cape Town ...	0 10 0	0 12 6	0 11 0	0 9 0	0 10 0	0 9 0	0 11 0	0 10 0	0 9 0	0 0 6½	0 0 7½	0 0 8½	0 1 6	0 2 6	17 0 0	1 4 0
Clanwilliam ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Colesberg ...	0 10 0	...	0 11 0	...	...	0 9 0	...	...	0 16 0	...	...	...	0 1 6	0 1 9	...	...
Cradock ..	...	..	...	...	...	...	...	...	...	...	...	...	..	...	...	...
Dordrecht ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
East London ...	0 11 6	0 19 6	0 11 6	0 10 9	0 9 9	0 15 8	0 18 3	0 12 0	0 11 0	0 1 6	0 1 0	0 1 0	0 2 9	0 2 9	..	...
Graaff-Reinet ...	0 12 6	...	0 14 2	0 11 6	...	0 12 6	0 12 6	...	0 7 0	0 0 11½	0 0 7	0 0 7	0 1 9	0 2 0	£11 10/ to £15	20/- to 24/6
Graham's Town ...	...	...	..	...	...	...	...	...	..	...	...	...	...	...	...	...
Kimberley ...	0 18 6	0 17 6	0 14 0	0 13 0	0 12 6	0 12 6	0 15 6	0 15 0	0 18 0	0 1 0	0 1 0	0 0 10	0 3 0	0 2 6	£15 to £18	20/- to 24/-
King Wm's Town	0 11 0	0 16 6	0 14 0	0 8 3	0 10 0	0 12 6	0 15 0	0 7 6	0 7 6	...	...	...	0 2 6	0 2 6	£16 to £24	20/ to 35/-
Malmesbury ...	0 10 0	0 14 6	0 12 0	0 11 0	...	0 7 0	0 9 6	0 6 6	0 14 0	0 4 6	0 0 8	0 0 7	0 1 6	0 1 9	14 0 0	1 3 6

CURRENT RATES OF AGRICULTURAL PRODUCE—(*continued*).

CENTRE.	A. Wheat. per 100 lb.	B. Wheat Flour. per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal. per 100 lb.	F. Barley. per 100 lb.	G. Oats. per 100 lb.	H. Oat-hay. per 100 lb.	J Potatoes. per bag	K. Tobacco (Boer Roll.) per lb.	L. Beef. per lb.	M. Mutton per lb.	N. Fresh Butter. per lb.	O Eggs. per doz.	P Cattle. (Slaughter.)	Q. Sheep. (Slaughter.)
	£ s. d.	£ s. d.	£ s. d	£ s d.	£ s. d.	£ s. d	£ s. d.	£ s. d.	£ s. d.	£ s d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Mossel Bay ...	0 12 0	0 14 6	0 12 0	0 9 0	...	0 6 0	0 16 0	0 7 6	0 18 0	0 1 0	0 0 9	0 0 9	0 2 0	0 1 6	...	...
Pietermaritzburg Natal	..	...	...	...	..	...	..	...	...	...	...	..	...	...	...	...
Port Alfred	...	...	...	0 12 0	...	...	...	...	0 6 6	...	...	0 0 7	0 2 6	0 1 9	...	..
Port Elizabeth ...	0 10 0	...	...	0 10 6	...	0 5 0	...	0 6 0	0 13 6	...	...	...	0 2 3	0 2 9	..	..
Queen's Town ...	0 11 0	0 16 3	0 11 6	0 8 6	0 5 0	0 13 0	0 15 3	0 4 0	0 10 6	0 2 6	0 0 8	0 0 8	0 1 6	0 1 9	...	...
Tarkastad ...	0 12 6	1 1 0	0 17 0	0 10 0	0 10 0	0 8 6	...	0 5 9	0 7 6	0 2 0	0 0 8	0 0 5¼	0 1 7½	0 1 9	...	...
Vryburg ...	0 16 0	1 1 0	0 17 6	0 13 6	0 5 0	...	0 13 0	1 1 0	1 6 0	0 1 3	0 0 10	0 0 10	0 3 6	0 4 3	16 0 0	1 5 0
Worcester ..	0 13 6	0 16 0	0 12 0	0 11 0	0 12 0	0 7 0	0 11 0	0 6 6	0 8 0	0 1 3	0 0 8	0 0 7	0 1 6	0 1 6	12 15 0	1 4 0

NOTE.—Returns have not been received from the Civil Commissioners of Beaufort West, Burghersdorp, Clanwilliam, Cradock, Dordrecht and Grahamstown.

THE

Agricultural Journal.

No. 5. THURSDAY, FEBRUARY 27, 1902. VOL. XX.

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EDITORIAL NOTES.

For the majority of people there is no more attractive reading than the cross-examination in a *cause célèbre.* It is so easy to conjure up in one's mind's eye the perky, flea-like lawyer and the puzzled, exasperated witness. If the witness happens to be known to us we can imagine him making an ass of himself as his tormentor worries him into saying something he never meant. In this issue of the *Journal* under the head of "The Selection and Breeding of Dairy Cows and How to Feed Them," we have had some witnesses in the box and some of them have blundered a little. The report itself, written by one of the principal witnesses, says, at the outset, that calves should be brought up in the way they should go, as milk producers, and not be allowed to get fat when young, lest the habit of putting on flesh should stay with them all through life.

They certainly ought not to get *too* fat, and perhaps that is what he meant to say. We want milch cows, when dry, to put on condition, for a good milker soon gets poor when in full milk. Besides, it is impossible to breed a first class milch cow unless her digestive organs are developed to their utmost capacity, and full feeding the young stock is essential to that development. This witness, when under examination, in answer to the question whether he would prefer spring calves being put on pasture? says: "No, keep them in the stable." But we wonder why? They would be healthier outside providing they were not exposed to undue heat or cold. Another witness testified that he had never lost calves by feeding separator milk. All we can do is to congratulate him on his luck, for it is rare to hear of successful exclusive feeding on this diet. A witness when asked what is good to reduce a caked udder? replied—"Bathe well *twice* a day with hot water, and apply camphorated oil well rubbed in." To realize the depth of laziness conveyed in this answer we have but to consider the serious nature of the disorder, the proper method of treating it necessitating the application of a huge well-made hot poultice, changed quickly for a fresh one as the old one gets cool, and kept in place till the udder is softened; or failing a poultice, warm blankets applied closely in bathing fashion to the udder and kept saturated with hot water till the disorder is reduced. No removal of the blanket or getting cold is allowable, so that unremitting labour and attention is sometimes required for many hours, and not abated till the udder is again normal. Now conjure up the farmer's lad, and a pail of hot water that will be cool in a few minutes, and the rubbing of, so called, camphorated oil twice a day, and it is easy to conceive that this treatment spells death to the cow. With these exceptions the discussion is useful, and as it is departmental many useful points may be picked up.

Mr. Henry de Smidt has been very successful in growing the delicate little banana known as "ladies-fingers." We saw the other day a specially good bunch of this sort which he brought in, wherewith to astonish his friends and set their mouths watering. It seems a pity that it is not more cultivated, at any rate by the skilful amateur whose aim is to supply his own dessert table rather than the rougher needs of the market. There is no lack of sources of supply to those who would fain domesticate it in place of the coarser plantain banana. Mr. W. van der Byl, of honoured memory, used to grow these bananas and exhibited them at the Horticultural Shows in the earlier 80's. There are also a good many in Mr. Middlemist's care at Newlands House. Perhaps the delicacy of the outer skin, and the small size, are two of the reasons for the preference shown on the market to the ordinary plantain banana. We like our market comestibles big, and the flavour is a secondary consideration. Similarly we get the good old spherical cow cabbage, a thing as big as a half bushel basket and as hard as nails, in place of the delicate, pointed table cabbage, and as a result when this fodder plant goes to the cook's boiling pot, all the neighbours up the street and down the street get a good whiff of its peculiar bouquet. The choice little banana is well known in Natal, but is not exported often, and it does not submit to rough handling and carriage.

While Johnnie Crapeau and his neighbours are overloading their cellars with tart watery wine that won't sell, vignerons at the Cape of Good Hope and Australia are wisely growing and maturing large quantities of the sort that will always be in demand. In publishing (at page 315) some particulars supplied to us by the *Wine Trade Review*, we do so, glad to remember that our country is counted among those which formerly drew its supplies entirely from abroad. Alas, however, we *still* import a huge quantity of wine from abroad, the greater portion of which is decidedly inferior to our own. With regard to the over-production in France, the explanation is found mainly in the fact that no culture gives so good a return per acre as the vine. Besides it will grow and provide some kind of a crop upon soils which are too poor to be used for any other culture. This is particularly the case with such soils as are too heavily charged with lime to serve for cereals. Indeed there are places where the vine is grown by the peasants in a soil which we would set down as little better than chalk. Of course in these circumstances the wine is of the poorest sort and serves to add to the immense quantity of almost unsaleable stuff of the *petit-bleu* kind, productive of wry faces and colicky pains.

We went to the Western Province Agricultural Show, and have, many times since, been asked what we thought about it, and not content with telling a few jaunty friends our thoughts we determined to record them in this *Journal.* Our general remarks are printed elsewhere, but here we want to say that the two days' Agricultural Show should be extended to three days. Open wide the wicket gates and let the money flow into the coffers for the first two days, when all the pleasure-seekers are there for half a dollar's worth of recreation, but let it be prominently borne in mind that Agricultural Shows, while run in the interests of the general sight-seeing public, are especially designed to benefit and promote the farming industry. The question is, do the shows fulfil their object in this direction? It is a matter of congratulation that in ordinary times our show grounds are usually well filled with exhibits. Visitors are expected to go over and examine the live stock and implements as well as the perishable products, such as fruit, vegetables and fresh butter, all in one day, or, in a few cases, in two days. But it cannot for a moment be supposed that any can in one nor, sometimes, in two days thoroughly examine nearly all the exhibits so as to acquire the new ideas as to methods of culture and note the hundred and one things that speak to the practical farmer through the exhibits of an Agricultural Show as plainly as a penny book. We know, in fact, that in the majority of cases the countryman who has on the first and second days of a show like that at Rosebank, to contend with the pushing, anxious, thoughtless crowd of visitors, all determined to see as much as possible for their money in a limited time, usually retires from the scene to wider spaces—the show is eventually closed and the farmer goes home with a jumbled vision remaining in his mind of windmills, pretty dresses, jumping and other competitions and all the jangle of an ordinary fair, nothing more definite in his memory than an idea that there were a fine lot of horses and cattle and a great mixture of wheels, flanges, windmills and smoke, aggravated possibly by the disappointment of not winning a prize for an exhibit that at other shows always ran away with the bakery. The fact is he and his fellow-culturists and tradesmen should have a third day when the machinery, implements and so forth which has cost so much to erect and display to advantage, would be shown and explained in full work. It is not improbable that the greatest amount of attention ought to be devoted to the exhibits of implements and machinery of field and dairy appliances, but it can only be done apart from the madding crowd. In short, a show at present running for one day only should have a second day for machinery, incubators, gates, fences, &c., sans band, sans competitions and other joyfulness, and to the present two days' show a third day should be added.

And last, but not least, the Government provides the expenses of these shows, pound sterling for pound sterling, with the express object of affording education and information as well as facilitating the getting of the best possible material. The Agricultural Department bestows lavish care on the shows and grounds, especially at Rosebank, the time and skill of its best experts being freely used from the outset, and yet, through an oversight, this public money and thoughtfulness are at present mainly dispensed on a sort of merry carnival. The evil can only be remedied by the addition of a purely farmer's day in the way suggested.

Our readers may on application be supplied by the Agricultural Department with neat leather reading covers for the current volume of the *Journal* at a cost of 3s. 6d. each, together with a set of patent wire clips for keeping the numbers in the cover. We use this reading cover in our office, and find it a great convenience in keeping the numbers together and in order for reference. It also preserves them from dust and dirt, so that they are worthy of their ultimate permanent binding.

Professor MacOwan, D.Sc., B.A., F.L.S.,

GOVERNMENT BOTANIST.

"No man better deserves the honour," were the opening words used by Professor Hahn at the Good Hope Hall on Cape University Degree Day, the 14th of this month, as he proceeded to state the reasons why Professor Peter MacOwan, B.A., F.L.S., should be invested with the honorary degree of Doctor of Science. Professor Hahn said that Professor MacOwan was appointed principal of the Shaw College, Graham's Town, in 1862. From 1869 to 1881 he was professor of chemistry at the Gill College, Somerset East, and in 1881 he was appointed director of the Cape Town Botanic Gardens and professor of botany at the South African College. Since 1892 Professor MacOwan has held the position of Government Botanist. He was a member of the University Council from 1876 to 1891. Since his arrival in South Africa Professor MacOwan has carried on the study of South African botany with enthusiastic zeal and great success, and his scientific work in systematic and applied botany is held in the highest esteem in South Africa as well as in Europe. Proceeding, Dr. Hahn said that he believed there was no man living in South Africa who had for so long a period been connected with scientific research and scientific work as Professor MacOwan. He could not do better than refer to the words of Professor Harvey, director of the National Gardens, Kew, who, writing in the last volumes of "Flora Capensis," bore testimony to Professor MacOwan's great work at the Cape, without which, Professor Harvey stated, the "Flora Capensis" would have been miserably incomplete.

The degree was conferred by the Vice-Chancellor amid applause.

Sheep Scab in the United Kingdom.

The returns issued by the Board of Agriculture show that during the month of December last there were 227 fresh outbreaks of sheep scab in Great Britain, as compared with 368 outbreaks in the corresponding month of 1900, so that there was a decrease of 141. The outbreaks occurred in twenty-five administrative counties in England, ten in Wales, and nine in Scotland. The largest number of outbreaks were twenty-five in Monmouth, sixteen in Montgomery, thirteen in Glamorgan, twelve each in Chester, Brecon and Denbigh, and eleven in Lancaster. During the month the disease existed in twenty-nine administrative counties in England, eleven in Wales, and thirteen in Scotland.

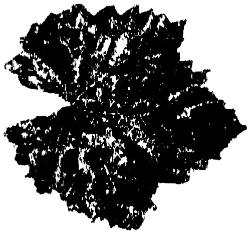
QUERIES AND REPLIES.

Diseased Vine Leaves.

I have had submitted to me specimens of diseased vine leaves. The trouble which the correspondent complains of is distinctly erinosis, and not fungus; it is the general result of a rich culture and damp atmospheric conditions.

The leaves of the vine become spotted with *Erinosis*, a disordered condition of the epidermal cells, arising from the superficial punctures of a small, almost invisible insect, *Acarina, Phytoptus vitis*.

Vine leaf affected with Erinose—upper surface showing swellings.



Lower surface of leaf, showing brown patches as they appear in autumn.

The mischief caused by the Phytoptus is somewhat like that resulting in what are termed galls on the oak and some other trees. The puncture alters the abnormal development of the stem in one case, and of the leaf cells in the other, and a quantity of monstrous growth speedily appears. If a fine microscopic section of the erinosed spot be examined, it will show the layer of epidermal cells more or less thickened and enlarged, and the outermost ones growing out into hollow thread-like projections which are more or less matted together.

After a time the protoplasmic content of the cells is exhausted and they become dead and brown, the erinosed growth showing in the general withered tint.

Generally speaking the careful and regular sulphuring of the vines, to prevent oïdium, has also the effect of destroying or dispersing the Phytoptus. In fact, the appearance of the erinosis is very often a tell-tale indication of the neglect of the essential sulphuring. I have not heard of the Phytoptus ever making headway when sulphur had been properly applied. And I think that authorities are agreed that in case erinosis becomes troublesome the best remedy is an additional sulphuring. Spraying with sulphate of iron and the copper lime mixture are of no avail, since the erinosis is not a fungus but merely a monstrous or abnormal outgrowth of the epidermis. *Mutatis mutandis* it might be compared with the growth of a corn or wart upon animal tissue.

E. P.

Kraal Manure.

May I say a word on E.P.'s reply to J. D. Mills' query in the *Agricultural Journal* for December 1900 as to the advisability of putting sheep manure on land (a) in its raw state, and (b) as to the advantage of pitting and rotting it first? The second query E.P. passes by. Where no other manure is procurable or the outlay too costly, what does E P. advise? Rotation of crops and fallowing but no application of sheep manure? Considering that sheep manure is still the most universally used fertilizer in this country, one is surprised to learn that farmers usually look upon it as a fertilizer which hardly pays cost of transport "to the land." The experience of very many both as regards land and garden is to the contrary.

In the Midlands, where sheds for stock are in general use, would the manure thus protected from rain and sun be of better quality than that lying in the open kraal?

Again, as the manure from kraals where large numbers of stock lie is constantly being covered up by new layers, have leaching and bleaching a great effect? While on this subject, I may say that where irrigation is necessary before ploughing, I have seen the plan adopted of putting the manure in a large heap alongside the irrigating furrow and shovelling it into the water when the land is being irrigated. This certainly saves labour. Does it not at the same time prevent waste, *e.g.*, through the dry manure being blown away, and also counteract the drying-out effect of the sun?

I feel considerable diffidence in putting forth a critique upon an expert's answer, but it seemed to me it left the questioner and those of us equally interested, "no forrarder" as to what we ought to do. Possibly my rashness may lead to a somewhat fuller and more practical discussion of the matter.

A. H. MURRAY.

You state that "kraal dung is a poor sort of manure at the best." This is contrary to the opinions and experience of the Cathcart farmers, who for many years have used this sort of manure with the greatest success. So great is the value put on this fertilizer that it is doubtful whether a wheelbarrowful of this stuff could be found in any of the kraals in that portion of the district where agriculture is successfully carried on. My own experience in working with this manure has been most satisfactory. Fifteen years ago I manured heavily with kraal manure one-half of a worn-out field which measured six acres. I cannot state from memory how many buck wagon loads were applied, but the ground was black with it. A farmer from England called at the farm at that time and made the remark that the manuring was overdone, that for a time the field would lie "useless." Useless or not, in the following spring I planted the manured patch with potatoes, with the result that I obtained 35 bags of large eating potatoes from each bag planted, although in the same field on the unmanured portion only 5 bags were obtained from each bag planted, and were of a very poor character too, and for a period of 12 years after the beneficial effects of this manuring were observable on each successive crop.

Twelve years ago my fruit trees began to show a very unthrifty appearance, either from excessive cropping or exhausted soil. I once more resorted to the sheep kraal, and manured the orchard heavily. An improvement was observable in the appearance of the trees in the following summer, but it was not until the second spring and summer that the great change took place in the growth of the trees, and size and quality of the fruit. The transformation was an object lesson, and one which I have never forgotten, and my fruit trees have never been allowed since those far-back days to suffer for the want of a little sheep kraal manure. The fruit trees to-day are pictures of health, carrying heavy crops of large luscious fruit.

Again, 4 years ago I manured with sheep kraal manure a strip of land across a 40 acre field. The length of the strip was 390 yards and the width 29 yards. On this strip I put 6 buck wagon loads of the "poor stuff." In the spring I planted the ground with potatoes and harvested a good paying crop. A row or two which happened to be planted outside the reach of the manure grew to the size of marbles only. The next sowing season I sowed wheat on the manured ground, and a good crop was reaped. The next season, oats were sown on the whole of the 40 acre field, and at reaping time three times the number of bundles of forage were reaped on the manured strip as were reaped on the same sized piece of ground on either side of the manure strip. Last year oats were again sown on the 40 acre field and I have just reaped the crop, and three times the weight of forage came off the manured strip as were reaped from any piece of ground of the same size on any part of the field. The forage when growing was always a foot higher than the surrounding growth. It kept a dark green colour through the growing season, and the distinguished growth could be seen by anyone standing miles away from the field, and the great density of the stubble now after the crop has been reaped can also be seen a long distance.

Two years ago a farmer in this district knowing the value of sheep kraal manure went to the trouble of riding the stuff ten miles from a farmer's kraal to his own field, with the result that last season he raised a record crop of potatoes on a piece of ground which would not have returned him his seed without manure. I may state that the soil in this upper portion of the Cathcart district is a sandy loam with a rainfall of 22 inches to 30 inches per annum and from 4,000 to 5,000 feet above sea level.

WILLIAM ROGERS.

REPLY BY E.P.

In this country, especially in some parts of it where labour is scarce and dear, the ultimate cost of a manure by the time it reaches the tilth, and is being used by the young crop, is excessive. In answering the correspondents' questions it occurs to me that the farmer has to consider how much, from first to last, the applied manure has cost him. There are not many who are sufficiently good accountants to systematically charge wagonage, service, digging, and hauling to the manuring account, when they get the manure from their own kraal, so that the point is often lost sight of. They will, however, count up every penny that the phosphatic slag or guano has cost them in hard cash and compare that outlay with the cost of the home-manuring from the kraal, to the great disparagement of the former. Every piece of work on a farm represents a money value. If it costs as much to put 5 cwt. of phosphate on a field as to put thereon half a ton of kraal manure, it by no means follows that the former of the manurings is the more costly of the two. One has to work at the actual manurial value given to the crop, whether his outlay, as in the case of the kraal dung, is merely haulage and wages, or whether, in case of artificial manure, it is a first cost in cash, plus the same haulage and wages afterwards.

The question to be decided in all such cases is whether the kraal manure is rich enough in manurial constituents or plant food to make it worth while to spend such charges upon it.

I have been about the country a good deal and have seen manuring from kraals pretty often. But as far as my experience goes, the custom has been to load from an old dried-up, disused kraal of many years standing, and haul away to the wheat-fields the remains of what was once manure. I have tried to show such folk that the stuff was little more than dry vegetable matter without any manurial nitrogen, and fit for very little else but to be burned in order that what lime and potash it might contain could be got at with greater compactness and less labour. And in most instances my advice to take the fresh, moist, urine-saturated, fermenting dung instead of the dry, washed-out stuff, was discarded. Excuses were made that it was not convenient; such work interfered with the stock; the side of the kraal had to be taken down to get at the content; and some kind of a fence improvised when the sheep came home; and thus the richest product of the kraal was passed by for the dry, worthless, convenient residue of perhaps five years ago.

If your friends who have written on this point were really using the contents of their kraals at their best, they might find that the results repaid the labour of distribution, and gave them a sufficiently near approximation to what would have been the result had they purchased artificial manures. It is encouraging to learn that some representative men are taking such a commonsense line, and I hope their number will increase a hundredfold. I turn to the report of the laboratory expert for 1899, and I find that one sample of the ordinary dry manure contains ·6 of phosphoric oxide, another ·27, others ·73 and ·96. What is to be thought of a manure for cereals which does not contain 1 per cent. of phosphoric acid? I think these figures, against which there is no appeal, plainly show that dry kraal dung, owing to long exposure to the rays of the sun, and leaching by the rains of several consecutive seasons, is a poor sort of manure.

But if experienced men like your correspondents, knowing the poverty of the manure in its dry condition, will therefore use it at its best while its nitrogenous contents are intact, then they may score up a good profit by saving the expenditure upon artificials. Such a course cannot, however, be safely taken for a number of years in succession. Cereals, which have a special faculty of collaring the phosphates out of the soil to make their crop of grain, must eventually be backed up by a liberal bonus of calcic phosphate, either in the form of ground bones, Thomas' slag, or superphosphate, upon occasion, and thus restore to the bearing tilth what the greedy crops have been taking from it year after year.

COUNTRY REPORTS.

East London.

Thos. Willows, F.C., 3rd Jan.—Rain is needed for the veldt and late sowings of mealies, and also for replenishing the water supply for stock. Young locusts are hatching near the coast and should be dealt with vigorously while in the hopping stage. No applications have been sent in to the Locust Board for soap for spraying purposes; however, farmers may be waiting for swarms to come together and thus deal with larger numbers at one operation. The pineapple crop is a good one, Japanese plums and apples a failure, and farming matters generally are not looking particularly bright.

Christmas Vale.

E. W. Holdstock, 3rd Feb.—The prospects for the month of January have been very discouraging. The slight rains during the month not being sufficient to plant late mealies it will now be too late. The veldt is very dry and water scarce. Young locusts have hatched out in some parts of the ward. I have not as yet held a meeting of the Locust Board as the other two members were indisposed; hope to meet during this week.

AGRICULTURE.

Western Province Agricultural Show.

Three years ago Rosebank was *en fête* upon the occasion of the holding of a show, national as regards farm stock and culture, and international so far as regards the crowd that passed the gates. The Malay was conspicuous with many wives and children, the raiment of the wives ranging in colours from pale green and yellow to vivid purple. The German, Frenchman, Italian, and representatives from nearly every eastern and southern clime, mingled with English, Dutch and Colonials from oversea and up country. There were bustling, beaming materfamilias and her eligible daughters, either in charge of exhibits of the lighter culture, among fruit, vegetables or poultry, or who came because it was pleasant to be there. As it was three years ago, so it was on Thursday and Friday last, and although the area whence the exhibits were drawn was restricted, there were enthusiasm and hopefulness indicating the gratefulness of the country-sider that the miseries of the past two years are fast coming to an end. The progressive young lady with her bottles of preserved fruits of every description from the delicate strawberry to the prickly pear was there again, taking pride in assuring everybody that some of the hermetically sealed jars contained fruits that had been placed there many years ago; and although we had but her assurance that the contents were as fresh as when sealed, we quite believed her statement, for the appearance of the fruit in its transparent preservative of sugar and water was quite equal to that which was freshly bottled for this show. The only fruit which appeared to have deteriorated was the strawberry, the colour having changed to a purplish hue, indicating nothing worse, so the exhibitor informed us, than an improvement in the flavour, if that were possible. Given a glass jar, with a simple, inexpensive screw top, or some other kind that shall seal the fruit hermetically, and there is a money-making trade to be done in uncooked fruit at home and abroad. Fresh vegetables were very much in evidence, and some magnificent samples of cabbages and celery attracted a good deal of attention. The fruit exhibits were not numerous, but they and the vegetables went to show what can be done by intelligent painstaking culturists.

The number of exhibitors under this head could be counted on the fingers of one's hands, which is, of course, regrettable, but there are causes for it which are easily found, arising, to some extent, from the disturbed state of inland trade and the restricted area. But all shows are attended by growers who never exhibit. They come to criticise and boast, and to tell you that they could beat the exhibits in the show. It seems to us that it would be much worthier if they came forward and encouraged the industry by exhibiting specimens of their work, and unless a claim be put in for extreme modesty or heart disease, we would like to know, through our "Queries and Replies" column, why our friends do not support their Show in this way.

Pigeons and poultry made perhaps the best display that they have ever done.

We need not dilate upon the scarcity of sheep and goats, for everybody knows that railway and other difficulties prevented their appearance.

With respect to the cattle, although the entries were not so large as on previous occasions the quality was, generally speaking, very much above the average. The first prize bulls that competed for the champion prize made the finest exhibit of the kind that has ever been seen in this country. We cannot help remarking, however, that the representatives of the smaller breeds of cattle have not a good chance in competing against the larger breed. Without in any way disputing the judges' awards on the present occasion, it is a matter for consideration whether, when the representatives of the different breeds are as numerous as they were at this show, they should not be divided into lots of heavy and light breeds, so as to give the smaller animals a chance of being judged according to their individual merits.

There were some splendid representatives of the Jersey, Ayrshire, Polled-Angus, Red-polled Kerrys and Dexters. The distinguishing points of these respective breeds not being so well understood by the average judge procurable in this Colony, the dominant breed, such as the Friesland and Shorthorn, are, as we have indicated, apt to receive undue favour. The group classes of the Friesland Jersey and Ayrshires were also very good exhibits.

The entries for Horses were very much less numerous than on former occasions, especially in the light and harness classes, but the quality was very good, especially, as we were glad to observe, in the breeding classes. In the show of thoroughbreds, Clevelands and Hackneys were excellent exhibits of the respective classes, and the representatives of the three heavy draught breeds were undoubtedly good animals.

In the Machinery Section Messrs. George Findlay & Co. made a fine show, among their exhibits being single and double furrow Garden and Field Ploughs, Hillside and Subsoil Ploughs, Land Rollers, Harrows, etc. A Potato Planter by Aspinwall created a deal of interest. This implement, drawn by two horses, is capable of planting 5 to 9 acres per day, the labour of one man being all that is required. The machine does the whole of the work, planting both large and small seed, either cut or whole, the concaves and pickers adjusting themselves to the size of the seed in their united action.

Messrs. Findlay also had a good show of Pumps, one, an Irrigation Pump, being shown at work by power from a "Decorah" Windmill. This Pump has a 12 inch cylinder and 6 inch suction pipe, and is capable of raising from 5,000 to 6,000 gallons per hour from any depth up to 25 feet.

They also had three Oil Engines at work, 1½, 6 and 15 h.p. respectively. These were running two Grinding Mills, viz., a No. 13 "Ohio" Feed Cutter, a Centrifugal Pump, and a Three Throw Pump. The capacity of the Grinding Mills is from 7 to 30 bushels of meal per hour, or, if the grain is required for feed purposes, they will turn out about three times the quantity. One of the greatest attractions was a "Cyphers" Incubator, shown in operation, for which Messrs. Findlay & Co. are Sole Agents. These incubators should command a large sale among farmers, as the cost of hatching is very small, and very little attention is required. With care and a little experience Messrs. Findlay's manager told us 90 per cent. of chicks can be obtained.

There was a good display of Reaping and Mowing Machinery by Messrs. Walter Wood & Co., Ltd., of London, and 63a, Bree Street, Cape Town, and we call particular attention to their 6ft. cut Open Rear Harvester and Binder, 1901 pattern, with roller bearings and all the latest improvements. Light Enclosed Gear Reaper of the latest type, strong and simple, 5ft. cut, for two or more horses. Light Enclosed Gear Reaper, 4ft. cut, with shafts and pole interchangeable for one or two horses. This machine is answering well for farmers who do not sow large quantities of grain and is very handy in irrigated lands. Tubular Tilt Bar Mower, a strong serviceable machine, will cut any kind of grass or bedding and does excellent work on lucerne. Used to a considerable extent in the Oudtshoorn district. One Horse Mower, a lighter machine but strong; very handy on small estates, parks, race-courses, &c.

They also exhibited a Hay Press for which they received a certificate.

The Walter A. Wood Company has been in existence for 50 years and their Reaping Machines were the first to be introduced into this Colony.

We shall be glad to send their catalogue to anybody requiring same.

Report on Irrigation in South Africa.

By Mr. W. Willcocks, C.M.G., M.I.C.E.,

(*Continued from page* 249.)

I repeat here what I have already said about the general decay of the Karoo veld. The bad Karoo bushes like the bitter bush are increasing rapidly at the expense of the aromatic sheep and snow bushes. The bushes in this Karoo are not so salty as the bushes in the Karoo south of the Nieuwveld mountains.

The water collected along the district roads and by the catchment drains of the Railway, and then turned over the undulating veld at fixed points, has apparently had more to do with the starting of the deep furrows and ravines than all the other elements put together. Such water in the Karoo veld will scour if it runs at a greater slope than one in fifty, and once the scour has begun the abrasion is so severe that veritable rivers have been formed in what were once grassy valleys. The Brak River opposite Britstown, which fifty years ago was a marshy depression full of long grass and bushes, runs to-day in a well-marked trough 200 feet wide and some 18 feet deep. In high floods it has 18 feet depth of water, and, at a slope of four feet per mile, discharges 15,000 cubic feet per second for a catchment basin of 3,600 square miles of Karoo, *i.e.* practically four cubic feet per second per square mile of catchment basin.

The Government might remedy much of the evil which is being done, or at any rate prevent further degradation of the soil by constructing cheap stone and brushwood weirs along the courses of catchwater drains of their roads and railways. Such weirs could be very cheaply constructed of the stones and bushes which are plentiful everywhere, and which would be made into very permanent works by surrounding the stones and bushes with galvanized wire netting. This type of work is exceedingly effective and is native to the country. The combination of this work with afforestisation would result in a decided gain to the country. At present the Government forests are confined to fixed areas and cannot have any effect on the country as to its own amelioration or to the amount of rainfall. If, however, the deep rents and drains along the public roads and railways were taken in hand and graded by means of periodically placed obstructions or weirs, the furrows and rents would fill in great part with deposits which might be planted thick with willows, poplars, tamarisks, acacias, gums, pines, and other trees according to the nature of the soil, which would not only stop all further degradation, but cover the country with long belts of green trees which would have an appreciable effect on the rainfall. Strips of 200 feet along every road and railway might thus be taken up and fenced in, and become the nucleus of future forests. The tamarisks and poplars could be pollarded and pruned and would thus provide ample fuel for the population of the Karoo.

Wherever cultivation was practised, and all along the railways, and in the alluvium of the streams near the railway stations, the Indian thistle was in evidence and had evidently come to stay.

As one advances North of the latitude of Britstown the pan and vale formation begins. This formation may be described as consisting, in this district, of alternate ridges of rounded dolerite hills and flat depressions. The depressions are either vales or pans. The vales have outlets for the water which collects in them; the pans, as a rule, have none. The pans and vales may individually be scores of square miles in extent or they may cover less than a square mile. Some are not more than ten feet deep and others are fifty feet deep. Very many of them are natural reservoirs of great capacity. Some are salted or brack and some are not. The hills occupy more than one-half the area of the country and are covered with vale grass, whilst the pans, as a rule, contain poor scrub and grass.

It will readily be understood that the rivers and creeks, which traverse the vales, have a very gentle slope when they pass through the vales. At such points, the rivers have a tendency to become deltaic and part with the heavy quantities of silt which they have brought down from the higher lands. Here the farmers put in stone and bush weirs enclosed in galvanized wire netting, and by means of these obstructions cause the rivers to leave their deposits in the vales. These deposits in the Karoo are extraordinarily rich and produce magnificent crops of wheat every year. As the soil is annually renewed, no manure is ever required. This system of irrigation is capable of great development and is a compensation on some rivers and creeks for the damage they have done higher up in tearing deep channels through the veld. Every effort should be made to utilise such vales to the utmost, and, indeed, the farmers know their business so well in this direction that they need no advice from abroad on the ordinary creeks. On the large rivers which traverse vales, and which are only partially utilised, the Government should execute proper contour surveys and not allow a single cubic foot of water per second to reach the sea before it has left behind it in the vale the soil which it had torn away from the country. Notably should this be done on all the rivers in the North-West of the Cape Colony. Mr. Bain has given me a description of these rivers which has convinced me that the system of vale irrigation (a modification of the basin irrigation in Egypt) is capable of great development in the North-West, and that, moreover, it could be done at a trifling expense by the aid of weirs constructed of stone and thorns enclosed in galvanized iron netting. Such weirs could be constructed to a height of eight feet on a width of forty feet without any anxiety, on streams where the floods have so short a duration.

Vales are, as a rule, not suited for reservoirs, and when such are utilised for reservoirs, as at Van Wyk's, I think the reservoir dam should be cut through and a regulator placed in it, and the water of the stream be forced to part with its silt while it still has a velocity of some kind, and this silt be sown annually with wheat. If the obstruction in the river or stream is too severe, the deposit is not sandy enough, and being composed of fine clay is unsuitable for cultivation. The obstructions should be such that the waters are made to part with the coarse particles of sand and clay, and are still able to carry with them the fine clay mingled with noxious salts.

The pans, where they are not brack, are the natural reservoirs of the country. Where the pans are brack, the numerous glens in the hills themselves lend themselves for reservoir sites. I take the Brak River Valley (of which I have carefully inspected a part under the able guidance of Mr. Mugglestone, Manager, and Mr. O'Connor, Assistant Manager, of the Smartt Syndicate, who own 100,000 acres in the neighbourhood) as an example of how I think such tracts should be utilised for agriculture. To begin with, I should make a reconnaisance survey of, and run trial lines of levels through the country which it was proposed to irrigate from the river. This would disclose at once the area of ground which was sufficiently flat for irrigation purposes. Then the most suitable pan, or glen, which commanded the area, might be chosen and trial levels taken to see whether it was not possible to lead the waters of the Brak River in flood into this reservoir by a subsidiary canal. As the Brak River seems to have a fall of about four feet per mile, a canal with a fall of two feet per mile would gain two feet per mile on the river. A stone and shrub weir enclosed in galvanized iron netting opposite one of the numerous dolerite bluffs on the river might be designed to raise the level of water in the *most ordinary* floods to a height of fourteen feet above the level of the river's bed. From up-stream of this weir would start a canal which would irrigate the lands with silty water from the river when the river was in flood and maintain the reservoir at a fixed height. During the dry season the water in the reservoir would be drawn on, and in times of flood the river water would be used directly. The river water would provide the sand and coarse clay needed to keep up the constituency of the soil, while the reservoir water would provide the necessary moisture. Without a proper survey and correct levels it would be unwise of me to say that such and such a site was the most suitable, but with these principles before him any capable irrigation engineer could prepare sound and reliable projects. The Houwater Reservoir, which is the most capacious reservoir I have seen in the Colony, might be fed from the Brak River and be capable of irrigating many times the area it will irrigate while fed from the creek on which it is situated. All lands perennially irrigated should be provided with drains midway between the irrigation canals, or it will certainly turn brack if there is any salt naturally contained in the soil. The smallest drain should be two feet wide and three feet deep, and have a fall of at least one foot per mile and be clear of obstructions. If the surveys and levels proved that there existed flat vales capable of being annually covered with flood deposit with the aid of weirs, it would then be a question whether it would not be better to substitute "vale irrigation" for "perennial irrigation." This question could only be settled by surveys and levels in the hands of an engineer who understood his business.

The scouring out of the soil and the general drying up of the country at the upper waters of all the South African rivers have been a misfortune to the country, but there is always some soul of goodness in things evil which should be observingly distilled out. The excessive supplies in the rivers may be modified by the works already proposed by me, and by afforestation, but, however they may be modified, they have become a feature of the country, and will remain a feature. The question now is, how to utilise these floods. I have shown that the waters are being utilised and can be still utilised for producing first-class crops of wheat in the flat vales; and that they can be used both for direct irrigation and water storage on suitable lands along their courses. If this utilisation of the flood waters is once seriously taken up, not only will the direct benefits to the country be great, but the saturation of the soil will result in springs of considerable magnitude, which will in all probability make many of the dry rivers of to-day into perennial streams of no mean order. I have been much aided in my comprehension of this Karoo country by a pamphlet written by the late Mr. T. Bain of the Cape Public Works Department. The pamphlet is in English and Dutch, and is entitled "Water Finding and Utilisation in the Karoo."

The Beaufort West Reservoir, situated in this Karoo, has a catchment basin of 60 square miles according to Mr. A. B. Brand, and a full capacity of 60,000,000 cubic feet. The dams hold up about 20 feet of water. The nett revenue from town plots and water supply was £1,000 per annum some 15 years ago, according to figures in the Government Reports. The reservoir cost £14,000. The silting up of this reservoir during 35 years of its existence has not been near so serious as was once imagined. It has struck me that this may possibly be due to the fact that the tearing away of the soil in the early days of the formation of the rivers as we see them was far more serious than it is to-day, and that the rivers to-day are not so muddy as they were, and that every year is likely to see a diminution. It is devoutly to be hoped that this may be so, though it should not prevent the Government from making efforts to diminish it by tree planting and training works. The silting up might be reduced to a minimum by turning all the excess water of the floods down the Northern Creek without letting it pass through the reservoir at all. A training bank along the up-stream water's edge of the reservoir would be all that would be necessary. The reservoirs along the Natal Creek in Johannesburg are protected from deposit in this way.

THE KAROO.

After a very careful study of the rainfall statistics, and all the observations and calculations in the numerous able reports written by Mr. Gamble and his successors, I may say that for the Karoo one should not count on more than 1,000,000 cubic feet of storage water from one square mile of catchment basin in the Eastern Karoo, and 500,000 cubic feet of storage water from one square mile of catchment basin in the Western Karoo. Years of good rainfall and ordinary years will give more, but in years of low rainfall it would not be safe to expect more. Allowing for waste or evaporation, in ordinary reservoirs holding up 20 feet of water, each acre of land under perennial irrigation may be credited with requiring 250,000 cubic feet per annum in addition to the rainfall. It may thus be assumed that in the Eastern Karoo each square mile of catchment basin may be depended on for four acres of perennial irrigation. In the North-Western Karoo we may consider one acre of perennially irrigated land as the most to be expected from one square mile of catchment basin.

Applying these figures to the Brak River, which has a catchment basin of 3,600 square miles, we may say that 15,000 acres of perennial irrigation might be obtained from it, while from the Beaufort West Reservoir an area of 240 acres might be irrigated.

Evaporation in the Karoo may be taken as seven feet per annum, and half that amount will be enough for the tracts near the sea.

In the reports of the Hydraulic Engineers of the Cape Colony are enumerated many reservoir schemes for perennial irrigation in the Karoo. The State should certainly select one of these schemes and give it a fair trial, and settle once for all this question of perennial irrigation from reservoirs in the Karoo. Mr. Gamble was very eager to see a reservoir constructed at Booysen's Pass between Graaff-Reinet and Aberdeen. I unfortunately could not see it owing to the rebellion. The local farmers consider it a perfect site for a reservoir, and Mr. Gamble considered it the best site in the Colony. Mr. Gamble states that the bed rock is exposed everywhere, and that with a catchment basin of 330 square miles. The capacity of the reservoir is as follows:—

54	feet high ...	... 37,000,000	cubic feet.
64	„ ...	... 107,000,000	„
74	„ ...	... 290,000,000	„
84	„ ...	... 560,000,000	„
94	„ ...	... 1,060,000,000	„
104	„ ...	... 1,980,000,000	„

A reservoir with a catchment basin of 330 square miles may be counted on for 330,000,000 cubic feet in years of minimum rainfall. In ordinary years it could store very much more. If, now, this reservoir dam was constructed 84 feet high of masonry, it would, from Mr. Gamble's figures, cost some £100,000. It could be depended on for 1,300 acres of irrigation in years of drought, and upwards of 2,000 acres in ordinary years. Any locality in the South-eastern Karoo, where perennial irrigation could be assured to an acre of 2,000 acres, would be the nucleus of a flourishing town, and the land would be worth £100 per acre for the 1,300 acres, and £50 per acre for the remaining 700 acres, some £160,000, and the township in addition. As the Cape Government has been collecting information on irrigation in the Karoo for some thirty years, the time has surely passed for collecting more information, and, indeed, one good example of a perennial reservoir of great magnitude would teach truer lessons of what the Karoo was really worth than another thirty years of information and study, and, to tell the truth, it would cost considerably less. If this reservoir, or some equally important one, were constructed, experiments could be made with the irrigation of orchards, fruit trees and vineyards by the aid of pipes on a small scale, and the result of irrigation with an expenditure of 100,000 cubic feet per acre per annum, instead of 250,000 cubic feet, be given a trial. In the rich Karoo soil and climate this economical system of irrigation might be as successful as it has been in California.

In order to test the comparative value of "perennial" and flood or "vale" irrigation, the State should simultaneously take up another stream in the Karoo, and, by the construction of weirs and training works, turn the flood waters of the flat vales, and convert the vales into wheat fields, in the manner practised in the Karoo wherever the streams naturally, or with a little insignificant aid, overflow their banks. Two good examples of these rival systems of irrigation would be of great value to the country, provided, of course, the works were entrusted to competent men accustomed to irrigation and its requirements.

THE EASTERN PROVINCES.

These provinces lie between sea-level and 5,000 feet above sea-level. They may be taken as occupying the catchment basins of the Fish and Kei Rivers, which both drain into the Indian Ocean. The country lies between the Stormberg Range and the sea. The fall of the country is very severe, indeed, far severer than anything yet described. From the Stormberg to the sea is a fall of 5,000 feet in two-thirds of the distance that it takes to fall from Nieuwveld Range of a mean height of 5,000 feet to the Orange River, which is about 2,500 feet above sea-level in the North-eastern Karoo. The country everywhere bears traces of this heavy fall except in the high plateau of the Stormberg. The Stormberg is rather a high-lying plateaux dotted about with hills than a mountain range. The rainfall on the high plateaux is sufficient in ordinary years to ensure good crops of potatoes and even wheat on suitable ground, but cultivation without irrigation is seldom attempted owing to the uncertainty of the rainfall, though, from what I saw and heard, I think it might be atte [illegible] on an extended scale, provided suitable manures and rotations of crops were attempted. Farmers in South Africa generally have had so much virgin soil at their disposal that they have got into a habit of considering manure and rotations as quite antiquated. They, however, forget that they are practically spending their capital in growing cereals year after year without rotation, and later on they will pay a heavy price to renew their exhausted lands. The flat undulating plains which constitute the Stormberg plateaux are more amply provided with dams and reservoirs than any other part of South Africa which I have seen. The farmhouses and gardens are frequent, and a single farmhouse may have three dams and reservoirs, one above the other. This trapping of the water and the general flat surface of the sandy soil results in a feeble discharge leaving the plateaux in all but years of heavy rainfall. It is on this account that the Steynsburg reservoir project had to be abandoned. The streams are traversed by numerous dolerite dykes, at every one of which a dam of some magnitude might be constructed and water stored.

At Molteno, on the top of the Stormberg plateau, I was shown over Mr. Vice's farm and plantation under the management of Mr. Philip Brown. The forest consisted of Pinus Pinaster and Pinus Insignis trees. The insignis was the quicker grower, but the pinaster was the hardier plant; both were doing remarkably well. The plantations consisted of plots of ground 450 feet by 450 feet crossed by roads 30 feet between.

The whole of the water supply for the plantation and garden consisted of two springs, one discharging two cubic feet per minute and the other one cubic foot per minute. These springs supplied the water for growing the young seedlings, which were transplanted when about nine inches high, and once watered. No further water was applied. The trees were planted at intervals of six feet by three feet, to be afterwards thinned out and made six feet by six feet. When the trees had attained five years of age they were to be pruned to a height of seven feet above the ground to protect them from fires. The trees had been in the ground four years when I saw them, and some had attained the height of 30 feet and girth of 15 inches.

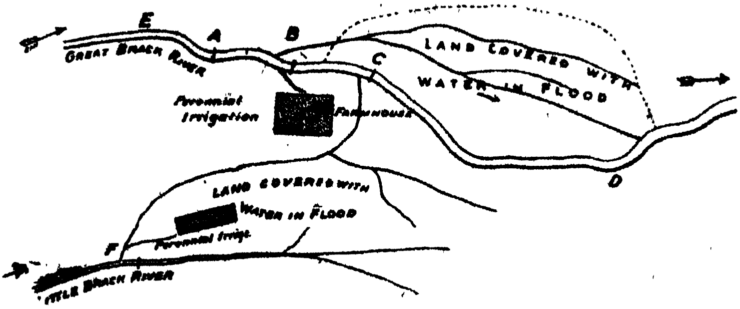
The pines were planted on the sandy soil, while fruit trees (such as apples, pears, plums, cherries, prunes and peaches) were planted in the dark dense soil of the valleys at intervals of 20 feet. The fruit trees were quite young.

Before any trees were planted the ground was first well ploughed and cleared of grass, and, if light and sandy, sown with wheat in April; if black and fairly heavy, it was sown with potatoes in November and December. The wheat was reaped in December and the potatoes harvested in April and May. The ordinary rainfall was sufficient to mature the crops. The soil of Mr. Molteno's farm was good, and he had a strong dyke of dolerite running along the entire length of the farm just above the farm. The potatoes were exceptionally good, and yielded seventeen bags to each bag of potatoes sown. Mr. Brown had Berkshire pigs and poultry, and his farm had a prosperous, well-kept appearance, which augured well for its future. While the fruit trees were young the ground between was sown with potatoes. Mr. Brown had been farming for Mr. Vice at Molteno for 4½ years, and had broken up 70 acres of ground, and planted it with trees. He hoped to extend his operations considerably.

It would be very difficult in this country to find large reservoirs such as the Government might undertake. The slope of the country as one leaves the Stormberg is too great, but I saw numerous sites where private individuals or municipalities might construct excellent reservoirs on creeks. Perennial water is so very valuable and produces such extraordinarily good crops everywhere in South Africa, that no landed proprietor who has a suitable site for a dam and reservoir should hesitate to construct one. Later on I shall describe in detail the types of dams which I consider most suitable for the different places I have seen, and I shall therefore give no details here beyond saying that at most of the dolerite dykes I have seen in these provinces, I should consider a dam of fifty feet in height as quite feasible. The direct storage of water for direct irrigation could be undertaken by private individuals at suitable sites on their own farms, but there is the direct storage of water which the Government might undertake on a very comprehensive, and, I consider, very effective scale. If we examine the valleys of the Fish and Kei Rivers, we are struck everywhere by the great denudation which has been going on for the last thirty years, and which is in full progress to-day. The collecting of the rain and storm waters at all the roads and railways, and their discharge down the valleys and depressions, has so torn out and abraded the light soils lying on the slopes of the hills, that insignificant streams and marshes are to-day deep ravines of evil appearance. The rain water courses away to the sea as it falls, and leaves the country more and more dry every year.

The Government should boldly grapple with this growing difficulty, and as its roads and railways are the principal offenders, it should begin systematically with the construction of stone bars and the planting of suitable trees—such as willows, poplars, etc.—in all the ravines. These would form soil and prevent further denudation if the works were systematically undertaken. The different proprietors should be encouraged to use the flood waters of the rivers wherever the levels of the ground suited. Mr. Southey's farm near Schoombie Station is an excellent example of the kind of work which might be undertaken at many places on the upper rivers of these Eastern rivers. Such works have a double effect, (1) the flood waters are directly utilised in irrigation, and (2) the soaking of the soil by this irrigation has the effect of increasing all the perennial springs further down the river.

The Great Brak River has a considerable slope in the upper part of the property between A, E and B. At A, B and C dolerite dykes cross the stream. On these dykes Mr. Southey has constructed masonry weirs built of undressed stone laid in mortar made of lime



and sand. No skilled labour of any kind has been employed and Mr. Southey has been his own engineer. The river has an average width of about twenty feet and depth of from ten to sixteen feet, according to the slope. An extraordinary flood will sweep the valley. A high flood may be taken as 2,000 cubic feet per second. The masonry weir at A is some four feet high and helps to store water and feed the springs. The weir at B is twelve feet high, but the head of water is about nine feet. The weir at C is about ten feet high. The river has a clear way of about 50 feet at the weirs, which are about two-and-a-half feet wide at the top and six feet wide at the bottom. Above the two upper weirs, where the slope of water in flood is severe, there is an average depth of water of about four feet and considerable pools of water. At the lower weir, where the slope of the river is small, silt has filled the bed of the river to the crest of the weir.

Up-stream of B on its left flank is a flood canal some eighteen feet wide, and on its right flank a perennial canal some three feet wide. This perennial canal irrigated the fields round Mr. Southey's farmstead. Its discharge is under one cubic foot per second, and as it only runs during the day, the discharge may be taken at 25 cubic feet per minute. The permanently irrigated area may be taken as 75 acres, principally lucerne, barley and oat-hay, and pumpkins for feeding stock. There is a dairy on the farm, and a fine fruit garden surrounded by willow trees. Up-stream of the weir at C the flood waters overflow on the left bank, and are led by a canal on the right to irrigate the lands on the right bank of the river, and also to irrigate with the flood-water the perennially irrigated lands. The Little Brak River also floods the lands, and from F, where a small weir four feet high has been constructed, the perennial waters of the river are led to a small perennially irrigated tract of land, and the flood waters are led to irrigate as much of the general farm as they will cover. The weir at F is constructed on a bed of kankar.

(*To be continued.*)

HORTICULTURE.

Practical Orchard Work at the Cape.*

The Artificial Character of Modern Fruit Trees.

1. Cultivation implies, first, a previous knowledge of the nature and constitution of the living being we propose to care for, and secondly, a previous knowledge of the soil and atmosphere in which it holds its dual life. It is only by such preknowledge that the cultivator can suit the conditions of growth to the wants of the thing to be grown, and thus place it in the best possible position for fulfilling the history of its life. Nothing short of this work, done of set purpose and as the outcome of exact knowledge, can be called *cultivation.*

2. But it is something more than this. It is not enough to reproduce plants in the precise form in which they exist in nature. Firstly, the cultivator, for his own benefit, aims at guiding and controlling the growth of certain plants so as to make them develop very differently from their normal original condition. Thus in one plant he endeavours to obtain seeds of large size and bland taste; in another the effort is to do away with seeds as far as possible and produce a large succulent fruit; in others, shortening of the axial growth and great enlargement of the leaves is aimed at. The plant then with certain limits is, like clay in the hands of the potter, capable of being remodelled, by causing this or that organ to take on an excessive and unusual development, without at the same time interfering with the balance of functions necessary for its general health. This complex art is one great part of *cultivation.* To practice it with success obviously demands something more than the loose, popular notions of plant-life, which are picked up without special study or thought, or come by imitating the traditional methods of our neighbours.

3. Secondly.—For many hundreds of years a close watch has been kept upon the seedlings arising in the reproduction of all cultivated plants. Whenever a sport or other chance variation has appeared, presenting characters of a desirable kind, the gardener has been quick to detect it, and by budding or grafting to give it permanence. And this continual watchfulness, awaiting the chance of betterment by natural variation, has produced the fruit and vegetable sorts approved and kept in being all over the world, so that in orcharding, as in all knowledge and civilization, we are to-day the heirs of countless unknown benefactors who have preceded us and handed down to us their best results. It must therefore be constantly kept in mind that the objects of our culture

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* By P. MacOwan and Eustace Pillans.

are distinctly artificial products obtained by centuries of selection and variation, and do not exist as wildings, nor can they put up with the conditions sufficient for wildings. As soon as skilled care ceases they cannot escape deterioration, and ultimately dying out. And that indispensable skilled care is orchard-work, a branch of cultivation in the wider sense, and is just as essential as the quick-witted observation which has detected chance improved variations when they do occur, and fixed them for all time.

THE CONSTRUCTION AND FUNCTION OF THE ROOT.

4. The descending axis which fixes the root in the ground by means of its numerous branches, has a central cylinder of wood-tissue, in which are large vessels, big enough to be recognised easily when cut across with a sharp knife. Round this is a layer of softer tissue, sheathing it completely. It is convenient to call it the *cortex*, because the word *bark* is used in a loose indefinite sense. In a seedling the cortex of the root is extremely delicate, almost transparent, and absorptive of moisture. In a mature tree the enlarged roots, popularly so called, have entirely lost the power of vitally absorbing water from the soil. They collect nothing whatever, their duty being to maintain the stability of the tree and to conduct away upwards through their woody central cylinder the fluid obtained from the soil for the use of the stem and foliage.

5. Then what part of the root does drink up the fluid food-material from the soil? Only a portion behind the extreme end of each delicate root-tip. This absorptive region is covered with fine root-hairs forming often a close pile like velvet, and thus enormously increasing the surface through which water can be taken up. It has not yet hardened and become discoloured. Long before this change has taken place the hairs drop off, and the portion of the rootlet on which they grew is comparatively useless for purpose of absorption. Meanwhile the tip of the rootlet has pushed further into the soil. New root-hairs have arisen on the

Figure 1.

Figure 1.—Root-hairs of a young wheat-plant.

newly-grown length, and they in their turn fulfil the duty required. The actual growing tip itself absorbs but little. It is covered with a protective cap of tissue, which is constantly wearing away and as constantly being renewed, and which serves to protect it from actual contact with the particles of the soil through which it is forcing its way.

6. All these facts can easily be demonstrated. A rape seedling carefully taken up exhibits the naked apex of the main root and the zone of root-hairs at some distance behind covered with adherent particles of soil. If these be gently washed off the close pile of hairs comes distinctly into view. Each hair is hollow and opens directly into some one cell of the root-wall, even as the finger of a glove opens into the cavity left for the palm of the hand.

7. Then it would seem that the transplant-trees one is accustomed to receive, with no ball of their original earth round their base and with but few root-branches projecting below, cannot immediately take anything from the soil when planted in a new spot? Most certainly they cannot. The first effort of life after replanting is to throw out new root-fibres, each with its protective cap to explore and forage among the fresh soil. As they elongate, absorptive hairs cover the space of a few inches behind the cap and begin their function, pouring the fluid taken up into the tissues of the root. As the lengthening proceeds, the hindmost hairs die off in a few days just in proportion as new ones arise behind the apex. Thus it appears that the part of the root which absorbs is perpetually moving forward and coming in contact with unexhausted particles of soil, instead of lying inactive among material which it has worked out. The root-hairs cling tenaciously to the particles they touch, and as it were mould themselves on them. Their moist surface is capable of dissolving traces of the mineral constituents therein, and the solution passes inward

Figure 2.

Figure 2.—Rape seedlings showing root-hairs covered with soil, and the same washed clean.

to the carrying system of the root. Having made ever so few new rootlets and having begun to absorb through the root-hairs upon them, the transplanted life of the tree is begun.

8. This knowledge should distinctly influence practical work in planting fruit trees. Extreme care in lifting and preservation of as much as possible of the small fibres of the root will repay the trouble taken. You thereby give the tree less repairs to make good. Use the six-pronged fork in the up-take, and as much as possible avoid the knife-edge of the spade. The quick formation of new rootlets depends upon a certain congenial warmth of the soil, with the presence of sufficient and not too great moisture. Hence in the parts of the Colony where, owing to altitude, the winter is severe, it is bad policy to transplant in early winter under the idea that the roots get hold of the ground before they make their spring start. Near the coast, where one may in winter have many consecutive days of mild weather, the root-system of trees so treated may begin to develop.

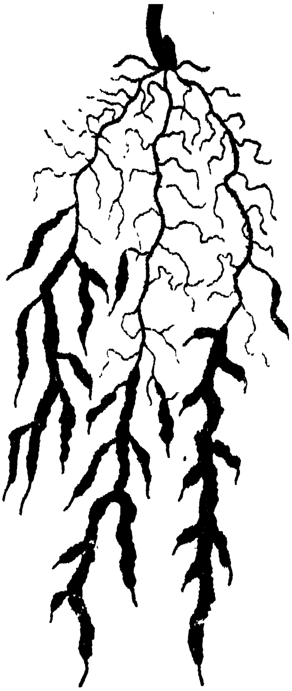

Figure 3.

Figure 4.

Figure 3.—Active and inactive zone of root of wheat plant.

Figure 4.—Tip of a root-hair covered with particles of soil, greatly magnified.

But it is certain to be checked by the first cold spell, and on the whole such winter planting is risky, and the losses greater than the gains. It is better to follow the method necessary at higher altitudes and with severer seasons, that is, spring-planting in soil which is daily becoming warmer under the increasing power of the sun. This is more conformable to the physiological life of the plant, and ensures its not receiving an injurious check.

With this knowledge the coarse method of chopping young transplants out with a spade so that they have only a few black ragged stumps left in lieu of roots will never be permitted. Such transplants if set in the ground must begin life by callusing the many wounds in the wood-tissue of their stumps, and then sending out rootlets from this callus-layer, *just as if they were cuttings set in to strike.* They have not even the chance that ordinary cuttings get, for the trunk and its numerous buds make immense demands upon the infant rootlets, far more than they can satisfy. And thus the miserable thing languishes, makes the poorest of growth above, and gets thrown back a season or perhaps more, merely for want of reasonable care in the up-take.

9. In a tree planted in well tilled, well-drained, well-opened soil, the advance of the root-tips is continuous till the limit of the tree's requirements is reached. In general one may say that the expanse of the foliage of a fruit tree gives a tolerably accurate measure of the expansion of the root-system underground, but obviously the feeding-ground of the roots is not close to the trunk, but in a circle whose radius is never less than half the height of the tree when matured. Whoever is aware of this phenomenon of a steady advance in the roots will go dead against the mischievous custom of applying irrigation-water and manure in a sort of hollow dug round the base of the trunk. Nor will he be a consenting party to the habit of planting trees in holes cut in an impervious clayey soil which has never been trenched. The normal advance of the root-system is stopped by the impenetrable walls of the pit, and the tree becomes unhealthy and short-lived, in spite of doses of manure and unlimited irrigation.

10. The relation of the root to the soil both as to mechanical condition, water-content and chemical constituents will be treated hereafter. These paragraphs give the most important facts as to structure and growth by which the fruit-grower has to guide his practice.

THE SOIL-CONSTITUENTS OF PLANT-FOOD.

11. We have now to consider what substances form the food of plants, and which of them the soil must contain in order to supply their wants. When the wood of a tree is burned slowly with very small access of air there results a mass of charcoal or carbon. All the moisture and a little of the carbon originally in the wood-substance have been driven off like gas by the heat. Whence did the carbon come? Wholly and entirely from the atmosphere, which contains a variable amount, from 3¼ to 6 measures, of carbonic acid gas in every 10,000 of air. The foliage absorbs this carbon-containing gas,

and turns the carbon to account in building up the tree's tissues. Let us suppose the log of charcoal is allowed to burn slowly away. All the carbon passes into the atmosphere again, being reconverted into carbonic acid gas. But there is left behind a small quantity of ash of a mineral nature. This handful of ash is the sum total of what the tree has drawn out of the soil in a dissolved state by means of its root-hairs, and without which constituents it could not have maintained a healthy life. If we analyse this ash we shall clearly get to know what substance a soil *must* contain in order to be fruitful, and what earth-elements go to make up the food of plants, independently of those contained in the essential air and water. They are as follows:—Nitrogen, sulphur, phosphorus, potassium, calcium, magnesium, iron, perhaps also chlorine. Of course, very small quantities are required, but they cannot be omitted. Plant life cannot go on continuously, without sufficient proportion of each one. Two other substances are always present, viz., sodium and silica, but they are not essential for healthy growth. Alumina, the base of clay, is also very widely diffused in most soils, but is not taken up by plants.

Nitrogen is presented in the form of ammonia and nitrates, and it seems probable that the ammonia is decomposed and converted into nitrates before absorption takes place. Not only is this element added to the soil by manuring, but it has been demonstrated that the vast number of bacteria existing in the superficial layers of earth are perpetually acting on the atmospheric nitrogen and converting it to the purposes of the soil.

Sulphur is present as sulphates, like gypsum, which is sulphate of lime; and to a varying extent this element appears in animal manure.

Phosphorus occurs in bone-earth, which is phosphate of lime, and in guano. In the majority of our Cape soils it forms a mere trace, and its practical absence is one of the severest drawbacks we have to contend against both in cultures and the raising of stock.

Potassium is proportionately abundant in such Cape soils as are derived from the weathering down of granite; in others the amount is much less. It occurs as potassium nitrate and chloride in many manures, and may conveniently be applied artificially.

Calcium, the base of lime, acts in plant tissues chiefly as a carrier of sulphur-elements. When this work has been effected, it is comparatively useless to the plant, and is stowed away as a refuse material in the form of minute crystals of oxalate of lime in the older cells. We shall presently see that other important uses of lime relate to the mechanical constitution of the soil, upon which it has a signal effect.

Magnesium and iron both assist in stimulating the function of the chlorophyll or green matter of the leaf-cells. Plants grown without those elements become pale, sickly and yellowish. The addition of a trace of iron and magnesium salts immediately fetches up the normal healthy green appearance.

These statements are not theories or fancy views. They are drawn from rigorously conducted experiments in what are termed water-cultures, and it is impossible to traverse the conclusions to which they lead.

RESPIRATION OF ACTIVE ROOTS DEPENDENT ON THE MECHANICAL CONDITION OF THE SOIL.

12. It cannot be too strongly impressed upon the cultivator that the roots of trees are not passive occupiers of the ground, but have vital functions to perform which require the soil to be presented to them in a suitable mechanical condition. *They have to respire.* If the soil around them be so compact as to exclude air, or if it be drenched with water so as to drive the air out of its interstices and keep it out, the roots will infallibly die. In fact they can no more do without the small quantity of air they need than animals can do without the enormous supplies necessary to their more active respiration. The difference is one of degree only. The respiratory process is the same, consisting in the intake of atmospheric oxygen, its use to oxidize carbon compounds, and the subsequent output of carbonic acid. But because vegetable respiration, even from the leaves, is very sluggish, and masked from observation by the much more active work of assimilating carbon to build up the tissues, it is apt to be overlooked. And from this ignoring of a vital necessity spring some of the worst errors in cultural practice. We have enumerated certain mineral soil-constituents which must be present amidst the vast bulk of earth the planter has to deal with. It follows from the above that besides these, and in far greater bulk, there must be present *air* and *water*. The only way in which these two elements, a gas and a fluid, can be secured for the service of the roots is by breaking up the soil into a more or less powdery, porous, open condition by mechanical means. In the interstices of the separated particles of earth there enters an abundant modicum of air, nearly equal in cubic measurement to the bulk of the solid matter of the soil. One may almost predict the degree of success of any crop by the degree to which atmospheric air has been mixed up with the earth it is to grow in. The traditions of agriculture unconsciously point to the same truth. To till land is to mix the top stratum with air. Coarse ploughing of wet lands is leaving the great slab-like clods lying loose to dry out their water and absorb water instead. Harrowing, among other ends, mixes air very completely with the loose tilth. But the most thorough and effective addition of this necessary ingredient is obtained by the process of *trenching*. By trenching almost every cubic inch of the soil is dissociated, large cavities full of air are left open among the loosely thrown upcast, and although these diminish a good deal by pressure of the superabundant material, yet the air they contained forces its way into the microscopic interstices between particles far smaller than grains of sand.

So much for the air-supply demanded by the root respiration. Let us consider the water supply. It is unfortunately the current belief that trees must have water given to them much in the same way as one waters a horse. Either whole bucketsful are poured in at the base of the trunk, or a stream is turned on to flood its

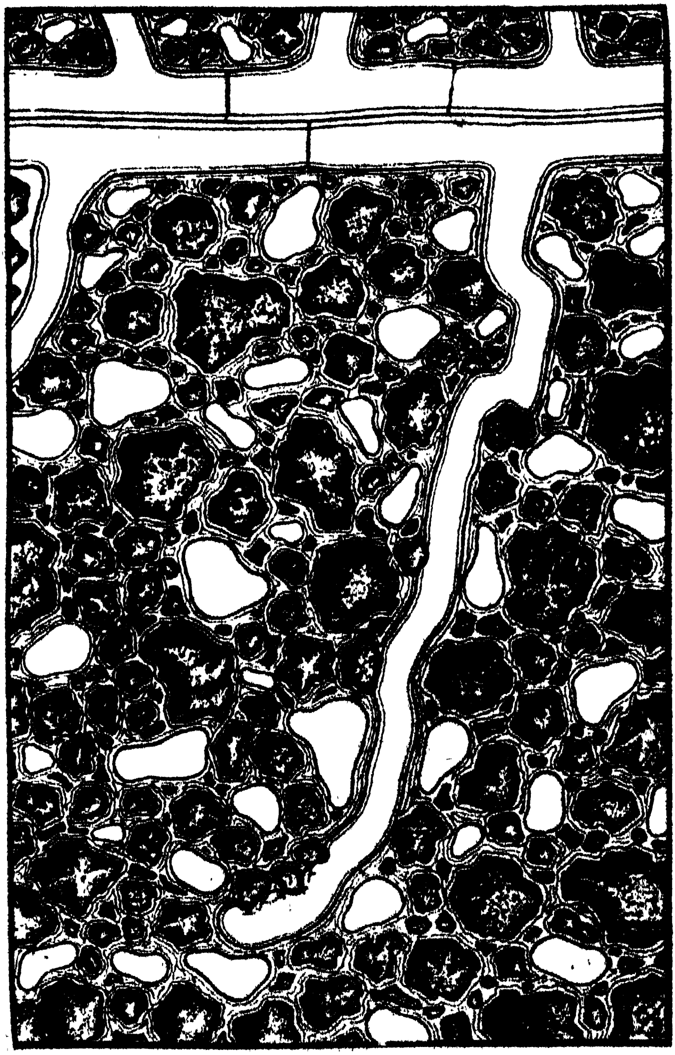

Figure 5.

Figure 5.—Diagrammatic representation of the relations of the root-hair to air and water in the soil. The angular bodies are earth-particles sheathed with a surface-film of water. The root-hair descending from the root has a similar water-film upon it. Larger portions of water fill in the interstitial angles. The numerous blank spaces, similarly film-encircled, are portions of air distributed among the mass.—*(From Sachs.)*

surroundings. This is in direct opposition to the natural way trees take up their water supply. "It is characteristic of the mode of life of land-plants that they only flourish, as a rule, when their roots are evenly distributed throughout a soil that is relatively dry, and only partially flooded with water."* The practice of agriculture bears testimony to this fact in that damp low-lying lands are made highly fertile by an adequate drainage which renders them relatively dry. The culture of plants in greenhouses teaches that land plants rooted in pots very easily perish if they are watered too often, and one of the first lessons a garden apprentice receives is "to keep his watering can quiet." Land plants, and particularly trees, carry on their root-functions continuously only when the soil surrounding them is relatively poor in water. A complete saturation must be very brief and soon relieved by draining away, or else it acts injuriously.

13. Let us consider how the enormous losses of water by daily transpiration from the leaves are made good by imbibition from soil, not wet, but only just perceptibly moist to the touch, and therefore in the best possible condition for sustaining healthy root-growth. Every minute particle of earth, even down to those too small for distinct vision, is enveloped in a thin film of adherent water held fast by surface attraction, almost as if it had been dipped in water and brought out wet. Where particles by reason of their angular shape happen to fit closely together, the attractions combine to hold a thicker watery layer. The remaining interstices are filled with air. Among these surface-wetted particles the root-hairs make their way, clinging tightly to them with their porous cell wall, and absorbing such part of the watery layer as they touch. It needs little knowledge of the laws of diffusion and capillary

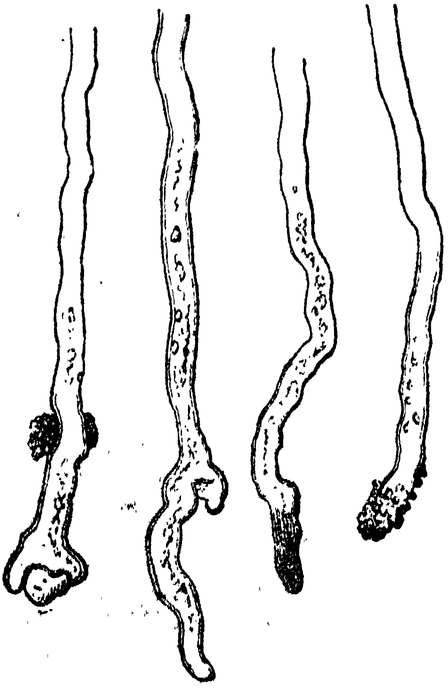

Figure 6

Figure 6.—Absorptive tips of root-hairs, highly magnified.

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* Sachs. Vorlesungen, XV. Engl. Transl. p. 265.

attraction to see that the fluid so absorbed is made good by neighbouring water-particles, and that, given absorption at any point, an indraw takes place towards it. Every root-hair then is a centre of attraction to the water constituting the moisture-layer of all particles of earth within its range. And such absorptions, multiplied by millions, amply supply the almost incredible number of gallons of water daily transpired as vapour from the foliage of a large tree.

13. But have these physiological facts any value in practical work? Much every way. They are what all successful tree culture is founded on, whether the workman knows and intelligently applies them, or whether he follows empirical rules that have been taught him without explanation of the reason for them. They show that compact, unaërated ground, which has never been mixed up with its own bulk of air by trenching to something more than the depth to which average roots penetrate, is not fit to grow trees. They show that the unfitness is only locally and partially rectified by digging out a two or three foot hole and making its earth contents as loose, aërated and open as the whole orchard area ought to be. They show that when the advancing root-system of the tree has got through the poor thirsty dozen cubic feet of decent soil in its hole, it reaches the compact earth walls around it and progress is barred. If the feeding tips force their way in, there is little or no air, and they cease to respire freely. If they coil back upon the loose earth in the hole, they find it impoverished, for it is their leavings of former years. Of course the trees' demands are just as great as ever, but the stifled rootlets in the hard untrenched soil and the famished ones in the hole-space cannot supply them. Then follows a lingering period of death, more or less drawn out according to circumstances. The young wood of the year dies back in the dry summer, making the well-known appearance atop that gardeners have likened to stag's horns. The leaves drop before their natural time. The fruit, if any, is small, dry and worthless. Branch after branch dries out, smitten with sheer famine, till the end comes. *This fatal error of insufficiently trenching up land meant for orchard purposes, and relying on the contents of small artificial pits, is one of the two reasons why Cape fruit trees are so short-lived.* The other reason is not far to seek, being dependent upon the same series of facts regarding the mechanical condition of the soil. Let us look back at the diagram representing a feeding root-hair as it feels its way among the congenial mixture of earth-particles, water-films and air. Carry the idea it represents over to a Cape fruit-tree planted in a hole the size of a 3 x 3 x 3 feet packing case, and surrounded by compact unworked ground. It is our turn to "have the water." Well, we run it on the depression round the tree. In half-an-hour the hollow is full. Bubbles of air keep pointing up in the pool. Now pray call to mind the diagram representing the conditions demanded for healthy root-life. Look at the large air-spaces. Then consider that by filling that three-foot hole with water till it stands above like a pool every bubble of the vital air has been drowned out and forced to ascend

and escape at the surface. What should be full of air is now full of water. The roots are completely immersed and their respiration is stopped. Fortunately, this state of things does not last long. Even the most compact clays slowly absorb water, and the destructive surplus percolates away through their substance, relieving the asphyxiated roots, and making way for air to enter from the surface. Such ill-judged contradiction of the laws of root-life therefore does not at once kill the trees. But the practice of more or less completely asphyxiating them by drowning several times a week is by far the commonest cause of the casting of fruit, the dying out of the special young shoots of the year, and the general short space of life allotted to a Cape orchard in other than sandy open ground.

(*To be continued.*)

Return of Fruit Exported

DURING THE MONTH OF JANUARY, 1902.

PORT.	Variety of Fruit.	No. of Packages.	Quantity.	Declared Value.		
		lbs.	lbs.	£	s.	d.
Cape Town	Apricots ...	86	2,560	32	10	0
	Nectarines ...	162	3,285	48	15	0
	Peaches ...	1,350	3,2576	526	12	0
	Pears	222	5,970	67	11	6
	Plums	1,829	87,540	700	0	0
	Totals ...	3,649	131,931	£1,376	8	6

DAIRYING.

The Selection and Breeding of Dairy Cows and How to Feed Them.

To the farmer who intends to make dairying a leading branch of his farming, the question of selecting animals suitable for the business becomes of the greatest importance, for his future success or failure largely depends on the class of cattle with which he stocks his farm, as no one, so far, has made much of a success of dairying with a lot of cows of the beef type.

Now, we have amongst cows two distinct types, viz.: The beef type and the milk type. They are of quite opposite formation. The beef animal is of a square, stocky build, with heavy quarters, deep flank, broad over the top of the shoulders, and a short, thick and round neck.

The dairy animal is of quite a different formation; is of a wedge shape, being broad behind, and tapering forward to thin shoulders. The quarters are thin, the flank well cut; the neck long, thin and flat. These are the general characteristics of the two types, and although we sometimes find a cow of the beef form that is a fair milker for a short time, they are not persistent milkers, and their heifer calves rarely make as good cows as they are themselves. The cow that milks for a long period is nearly always the most profitable cow. As a matter of fact, we cannot afford to keep cows that we have to board for six or seven months every year. There is no farmer who would submit to having three or four idle fellows sitting at his table, year after year, and earning nothing; yet the same man often has three or four cows in his stable that are doing the very same thing. We must weed out these robber cows if we expect to make dairying a paying business. Now, how are we to get cows that will pay? By breeding and selection. Take the best common cows and breed them to a good bull of one of our dairy breeds. Don't expect to get good cows from a beef-bred bull, any more than you would expect to get race horses from a Clydesdale.

In selecting a bull find out what kind of a milk producer his mother was; also if she had a well-shaped udder, with all the teats perfect. This is a very important point, for if you breed from a bull whose dam had an imperfect udder, the probabilities are that a large majority of his heifers will be defective in the most important point of a cow, viz., the udder. This seems to be a defect that is transmitted through the bull with almost unerring certainty.

Select the best heifer calves from your best milkers. Never try to raise a puny, miserable calf. They never make good cows, as they have not the constitution to stand heavy work in the dairy line. These calves must be fed in such a way that when they become cows they will go in the way we want them to, that is, produce milk, and not put on flesh. They must, therefore, not be allowed to get fat when young, as the habit of laying on flesh is very likely to stay with them all through life. [See Editorial Notes.—EDITOR, Cape *Agricultural Journal.*] Our own practice is to feed the calves with milk fresh from the cow for about two weeks, then begin to substitute part separator milk, with the addition of a little scalded oil meal or flax seed, to take the place of the butter fat we have removed, and by the time the calf is a month old it is generally entirely on skim milk and oil meal. At this time it will begin to eat a little oat chop and bran, also some early cut clover. Allow it all it cares to eat of these foods. We continue the milk for seven or eight months, if possible, and the grain until over a year old. By this method we can raise big, strong calves without getting them too fat. Heifers should be bred to calve at from two years to two years and a half old. If they are allowed to go until they are three years old they are more apt to get fleshy, and do not make as good cows. Heifers with first calves should be kept milking for a long time, as it is with the first calf that the habit of long milker is formed, and if they are allowed to dry up say six months from calving, the probabilities are they will do the same thing every time.

In feeding cows for milk we must be governed a good deal by conditions in our choice of foods, so as to feed as economically as possible. We must try to raise all the food ourselves, as when we have to buy it, it cuts quite a hole in the profits. There are certain rules, however, for compounding suitable rations, by which we must be guided to secure the best results. It has been found that cows to produce a large flow of milk, must be fed on foods that contain a large percentage of protein, or flesh-forming substances. Such foods as oats, peas, bran, oil cake and cotton cake have been found to give the best results. Clover hay is also an excellent food, and whichever of these foods is the cheapest is best. This protein is the most expensive of all the foods with which we have to supply our cows, and it requires good judgment to tell which is the cheapest source from which to get it. The carbo-hydrates are comparatively cheap, as we get them in all our coarse foods, such as corn fodder, ensilage and straw. Roots are excellent for the production of milk, but they are more expensive than ensilage. Still, it always pays to have some, as the more variety we give our cows the better they will do.

The regular salting of cows is a very important matter, and one that I think is often neglected by farmers. Cows require from one to two ounces per day. The best plan is to have some salt where they can help themselves whenever they want it.

Cows also require a large quantity of good, pure water, and if the chill can be taken off in winter so much the better, for, if they are obliged to drink intensely cold water, they cannot do their best, as it takes a large part of the food to warm that water to the temperature of their

In conclusion, the care of cows can be summed up in one word, Comfort, and the man who takes the most trouble in looking after the small details and makes his cows comfortable, is the man who is going to make the most money out of them.

DISCUSSION.

Q. How would you ventilate a basement stable?

A. R. S. Stevenson: By air-tight boxes running up through the roof and reaching down to within one foot of the stable floor, with one or two traps that could be opened or shut as needed.

Q. Are concrete floors a success?

A. Yes, especially for cows. I do not find them cold, and can save all the liquid manure. They are durable and comparatively cheap.

Q. What would you do for inflammation of the udder?

A. Bathe well with warm water and rub with sweet oil and laudanum.

Q. Do you recommend milking cows to near calving?

A. Yes, to within two months of calving.

Q. Would you milk a cow before calving if her udder was distressing her?

A. Yes, if any danger of garget.

Q. Is whey or separator milk the best food for calves?

A. Separator milk.

Q. Would you dishorn calves or wait until older?

A. I would wait until two years.

Q. Would you prefer spring calves being put on pasture?

A. No, keep in the stable.

Q. Do you find it practicable to feed grain whole?

A. No, I prefer grinding fine.

Q. How long should cows milk?

A. Until six weeks or two months of freshening.

Q. At what age should heifers calve?

A. At from two years to two years and six months.

Q. Do you consider length of body an important part in a dairy cow?

A. Yes. A long-bodied cow is more likely to be a larger consumer of food than a short cow; and, as a cow can only produce milk from the food she consumes, the big eater is always the more profitable. Beware of the shy feeder.

Q. What is the best grain feed for cows?

A. The foods rich in protein, such as bran, oats, peas and oil cake. A mixture of different grains is most desirable, as cows like a variety as much as we do ourselves.

Q. How much will it cost to put a supply of water into the barn from a well forty or fifty yards away?

A. D. C. Anderson: £17 for the windmill, £3 for the tank, 4d. a foot for pipe, and 8s. each for the metal water basins with lids on them. On the average farm £30 would put water into most barns.

Q. How do you get your own water supply?

A. I have a living spring some distance away, and I force the water up to my house with a hydraulic ram, into a large tank. The house is higher than the buildings, and I have a pipe laid from the house to the barn, also across the road to my other farm.

Q. Of what would you build a basement wall?

A. Three sides of stone and the front of frame. One of the best basement barns in our section has the basement entirely of wood and frame-work on a stone foundation, raised about one foot above the ground.

Q. Would you advise the raising of a low, old-fashioned frame barn?

A. No; better results will be obtained by taking the old barn down, using what timber is in it. Add ten or twelve long posts, and then you have a good barn, with a fine basement for the animals.

Q. Do you see many plank barns?

A. No; mostly frame.

Q. Would it not be better to have the cattle on the second story and have the manure below? It is handier to clean out the stables.

A. Having the cattle in the basement, when it is properly built and ventilated, is far too valuable a space for a manure heap. In a dairy section, milk would be very liable to take up bad odours from the manure basement. Better to haul the manure direct to the field.

Q. Have you ever lost calves by feeding separator milk?

A. Erland Lee: No, but have heard of people who have; think they must have been overfed or fed from dirty pails.

Q. What is a proper standard to judge a cow by?

A. W. C. Shearer: About 5,000 pounds of milk, or 260 pounds of butter. Any cow that will not produce either of these amounts in a season had better be fatted for the butcher.

Q. How long should a cow milk each year?

A. From nine to ten months if she is a regular breeder.

Q. What is the proper, standard, amount of milk or butter for a cow yearly?

A. Five thousand pounds of 3½ per cent. milk, or 260 pounds of butter.

Q. Can anything be done to train a heifer to be a persistent milker?

A. Yes. Feed her well and regularly, and milk her at least ten or eleven months her first season.

Q. What is good to reduce a caked udder?

A. Bathe well twice a day with hot water, and apply camphorated oil, well rubbed in. [See Editorial Notes.—EDITOR, Cape *Agricultural Journal.*]

Q. Do you believe in feeding grain while cows are dry?

A. Yes. A small grain ration is required to build up the constitution for the next year's work.

Q. Will ensilage taint milk or butter?

A. No. Good ensilage makes the choicest butter and milk, and also one of the cheapest foods one can raise.

Q. Can you by better feeding increase the butter fat of milk ?

A. Andrew Elliott : No, not when cows are in normal condition.

Q. Is there any early fodder that can be used to supplement pastures when they become dried up in summer ?

A. Silage is the cheapest and best. Mix clover, peas, oats and clover hay.

Q. What kind of food do potatoes make ?

A. In order to get the best from them, they should be cooked.

Q. Are apples of any value as food for cows ?

A. A few apples are beneficial, especially if sweet.

Q. Would you recommend the feeding of turnips to cows when we send the milk to the factory ?

A. Decidedly not.

Q. Last year it was said that turnips could be quite liberally fed and not taint the milk, either for butter or cheese manufacturing. How do you reconcile your answer with his experience ?

A. Mr. Woodward : I do not attempt to. My experience and the experience of factory men all over the land tell me that it cannot be done.

Q. What is the best system of paying for milk at the factory ?

A. By butter fat test.

Q. How would you feed a calf that is scoured ?

A. Remove the cause. If the case is severe, feed new milk for a time, until the digestive system becomes regulated.

Q. Is rock salt as good or better than ordinary salt ?

A. We prefer rock salt for summer, and the ordinary salt for winter. When rock is used, it should be kept in boxes in the field, where the animals can get at it with leisure.

Q. At what age do you castrate young pigs ?

A. About seven weeks old, or just before weaning ; at that time the mother's milk will help them along.

Q. Would you milk cows before calving ?

A. No, not unless it is absolutely necessary for the preservation of the udder.

Q. Is there any difference in the churning temperature of the different breeds ?

A. Yes. Cream from Jersey cows may be churned at a lower temperature than cream from Ayrshire cows.

Q. What is the value of the gravity separator (hydro-lactic) ?

A. By diluting milk with water we increase the difference of the specific gravity between milk and cream, and, in this way, a very complete skimming can be obtained ; but it is objectionable on account of the increased bulk of skim milk that must be handled. Then this skim milk, on account of the water added, is not so valuable for feeding calves.

Q. At what age would you breed your heifers ?

A. So that they will come in about twenty-eight months of age.

Q. What points would you consider good for choosing a dairy cow ?

A. R. Twiss: A long, deep, capacious body, a long, thin neck; legs a little small in proportion to body; a small, tapering tail; small head, with plenty of width between the eyes, and the eye large, with a mild expression; the veins running from the udder to the abdomen large, and the more crooked the better; the more width between the ribs the better, as close ribs denote beef.

Q. Do you think turnips can be fed to milch cows, in limited quantities, without flavouring the milk?

A. H. Glendinning: The flavour of feeding turnips is a matter of degree. If feeding ten turnips per day makes a strong flavour, one turnip will give one-tenth of that flavour; and it may not be perceptible to the palate of every person.

Q. Do you think feeding turnips immediately after milking will give less flavour to the milk than if fed immediately before milking?

A. No. I do not think it will make any difference, although many people think it does.

Q. Why do you think it makes no difference?

A. Many people, from constant use of the milk obtained from cows fed on turnips, become so accustomed to it that they do not detect any turnip flavour. My reasons are based upon experience, and the construction of the cow's digestive organs.

As milk is a secretion from the blood, it would take several hours from the time the food is eaten by the cow until the nutriment is taken up by the blood and passed into the milk, and I cannot see how a few minutes' difference in the time of feeding, either before or after milking, can make any difference to the flavour of the milk. Some people will tell you that it is the breath that affects the milk. Well, there is some sense in that, as the breath contains the waste products of the blood, from which the milk is secreted; but it must be remembered that the cow does not throw off any offensive flavours by the breath while the food is stored in the paunch, or first three stomachs.

Q. When is the best time to clean the stables, after or before milking?

A. A. P. Purvis: I think after would be better than before.

[Why? Would it not be better to milk the kine in a clean, inodorous byre than in a dirty and littered one? In a clean, sweet byre there is little fear of dust or odour affecting the milk or annoying the cows and the milkers, while it seems incongruous for the animals to emerge from the fresh air into uncleaned stables.—[EDITOR, Cape *Agricultural Journal*.]

Q. What causes so much cream floating on some milk in the morning?

A. Want of proper care, aeration and stirring while cooling and after.

Q. Can the can be thoroughly scalded with the cover on?

A. I don't think it can be done as well as by scalding each separately.

Q. Why is not Monday's milk as good as any other for making cheese?

A. It is as good if properly cared for. The trouble is, that the old Sunday morning's milk is cooled before airing.

Q. Do you think frozen milk is injurious for cheese-making?

A. I don't think it spoils it, but it makes it more difficult to generate proper acid, and perhaps causes pasty cheese.

Q. Do you believe in paying for milk by Babcock Test?

A. I think by using an addend of 2 or 2½ to Babcock Factory reading, there would be more satisfaction than pooling or net Babcock Factory reading.

Q. Do you think the animal odour can all be removed from the milk by aeration?

A. Yes, I am sure of it; but I do not say that you can remove all bad or foul odours by aeration, as I do not think you can.

Q. Would you advise the cheese-maker to refuse all milk that is tainted or that stinks?

A. I certainly would.

Q. What is the best kind of material to make a whey tank of, wood or galvanized iron?

A. Wood, as the whey very soon eats the iron away.

Q. Do you approve of whey vats elevated?

A. Yes.

Q. Is milk fever more common in cows pastured on grass?

A. Dr. Reed: No. The fresh grass acts as a mild purgative, and tends to overcome any unhealthy condition in cows.

Q. Can butter fat be increased in milk by feed of any kind?

A. It is doubtful whether it can be increased at all. At any rate, it cannot be increased to such an extent that the increase is of any practical importance.

Q. Do you water twice a day?

A. No, but I would like to if I had stable appliances to do so.

Q. Is skim milk a good cow food?

A. Yes. (R. McCulloch, of Snelgrove, has good success with it.)

Q. What is the reason we cannot get as much for our cattle as the Americans do?

A. James Tolton: We do not finish our cattle; we sell them too soon.

Q. Do you feed your grains dry?

A. Yes.

Q. What is the best age to fatten if you raise your own cattle?

A. Two years of age, for profit.

Q. At what time do you dishorn?

A. Mr. Pake: From six weeks to six months.

Q. What would you give to scouring calves?

A. T. G. Raynor: Egg, castor oil and flour. Teaspoonful of rennet.

Q. Do you cut hay and straw for stock?

A. D. C. Anderson: Yes, part of it, when feeding long and coarse straw. We pulp our roots and mix with the cut straw or chaff.

Q. Some of the delegates, who have been successful, claim that it is worth five dollars to the calf to get its first feed from the dam, and to let the dam lick the calf?

A. A. C. Hallman: Let them prove it. I can't.

Q. Does it prevent milk fever to let a calf suck its dam for a day or two?

A. Perhaps it does in some instances, but sometimes the fever has commenced before calving. It is better, if the udder is very much distended, to milk some for a few days; and a few light doses of salts is an excellent preventive.

Q. Which is the better for a dairy cow, roots or ensilage?

A. Better to have some of both.

Q. Do you think a cow with a fleshy udder gives richer milk than a cow with a soft udder?

A. No, not as likely to be as good.

Q. If you were establishing a dairy herd, what breed would you select?

A. If for a cheese factory or for milk, I would take the Ayrshire or Holstein.

Report of the Superintendent of Farmers' Institutes of the Province of Ontario.

FORESTRY.

The following correspondence has taken place between the Conservator of Forests, Cape Town, and the Director of the Botanic Gardens, Sydney.

In a large plantation at Tokai, near Cape Town, comprising over 1,200 acres, I am now planting amongst other trees, large quantities of the following Eucalypts:—

E. marginata
E. diversicolor
E. resinifera
E. pilularis
E. paniculata
E. siderophloia
E. sideroxylon
E. crebra
E. microcorys
E. corynocalyx

Would you kindly place these trees in what you would consider their relative order of merit for timbers, and insert any other

Eucalypts which you would place amongst them as first class timbers. Their comparative growth I am already in a position to gauge, and I have made some tests on the durability of their timbers by placing posts in the ground. But the wood is really too immature to enable me to draw sound conclusions from these tests.

E. Hutchins,
Conservator of Forests, Cape Town.

In reply to your letter of the 29th November last, asking for information *re* timbers of Eucalypts, I beg to inform you that a good deal depends on soil and climate as regards the quality of the timber of the same species, as you are aware. I enclose a copy of my "Notes on Commercial Timbers, etc.," which gives notes in regard to most of the timbers referred to.

Eucalyptus marginata and *E. diversicolor* are both Western timbers and should be bracketed together of approximately equal value. All the rest are Eastern except *corynocalyx,* which is Southern. *E. resinifera* is similar in appearance and quality to *E. marginata.*

E. paniculata, E. siderophloia, E. crebra, E. sideroxylon are Ironbarks and I place them in order of merit as above. First class *paniculata* is by many people considered the most valuable Australian timber.

E. microcorys is a pale timber and perhaps the very best of pale timbers. It is in some respects *sui generis. E. pilularis* would come next to it, but it is a freer, quicker growing timber. It is durable and pale coloured but certainly inferior to *microcorys*. *E. corynocalyx* is a pale timber but of inferior merit as compared with the other timbers in your list, since it warps so seriously in seasoning. But it has the great merit of growing rapidly in districts with low rainfall. I do not call it first class.

I would certainly add to your list as first class timbers:—

E. maculata.
E. punctata and *E. propinqua* (two closely allied species).
E. saligna (for moist situations).
E. tereticornis.

J. H. Maiden,
Director Botanic Gardens, Sydney.

VITICULTURE.

The Over-production of Wine.

From two or three European countries we are now constantly hearing of the trouble caused by a plethora of wine and the insufficiency of demand, and it is unlikely that the position will be improved in the near future. The European viticulturists—and this applies especially to those who produce cheap wines—not only find themselves virtually excluded from certain markets by prohibitive tariffs, but they see the cultivation of the vine being extended in countries which formerly drew their own supplies from abroad, and are now exporting. These are causes which are not easily overcome, and it seems that if the European grower is to remove his present difficulties he will be obliged to devote his attention to the question of quality rather than to an excessive and embarrassing production. In France the viticulturists in certain departments—those where cheap wines, mainly for home consumption, are grown—have been engaged for some time in a violent agitation, and have gone so far as to threaten a strike in the form of a refusal to pay rates or taxes or to take part in any kind of local government.

The trouble began after the heavy yield in 1900, and it has been intensified by this year's abundant crop. The official statistics just published show that the wine crop of France this year is estimated at 57,963,514 hectolitres—22 gallons to the hectolitre—or 9,389,147 hectolitres less than in 1900, but 18,005,372 hectolitres above the average of the last ten years. To this total of 57,963,514 hectolitres, according to the custom of the French, has to be added 5,547,000 hectolitres of Algerian wine and 200,000 hectolitres of Corsican wine, bringing the French wine crop up to 63,710,514 hectolitres. The large crop is to a great extent the consequence of the replantation of the vineyards. The estimated value of the crop is 952,228,941 fr., including wines of a superior quality, 81,922,261 fr. During the first nine months of the present year the home consumption of wine was 32,119,079 hectolitres, being an increase of 5,315,302 hectolitres compared with the same period of last year. The increased consumption in France is due to the suppression of the octroi duties on "hygienic beverages," and the result shows the wisdom of the course taken, at all events in regard to wines.

All kinds of proposals have been advanced with a view of relieving the present tension. Attempts must be made to obtain a relaxation of foreign tariffs, soldiers should have liberal daily allowances of wine, freights must be lowered, *sucrage* ought to be suppressed, and so on—failing all or some of which measures, it is threatened that taxes and ordinary debts will not be paid, and work will be actually discontinued. It must be remembered that, as we have already stated, this agitation is proceeding chiefly in the departments which produce the cheapest wines, and not in those best known to consumers in this country. Some of the growers have taken the matter into their own hands and started retail establishments in Paris and other towns, but in doing this, it is hardly necessary to say, they have alienated the sympathy of the merchants, their natural allies. The *Moniteur Vinicole*, in dealing with the various remedies suggested, dismisses some of them as impracticable or unsuitable, and especially condemns the establishment of retail shops. Our contemporary's advice to the growers is to reduce the production by pruning more freely, and to give increased attention to the quality. Meanwhile, the wine crisis has occupied the attention of the Chamber of Deputies day after day, and it has now been decided to appoint a Parliamentary Committee of twenty-two members to report on the numerous proposals submitted.

A curious outcome of all the discussion that has been going on is the suggestion that relief might be found for the viticulturists by distilling the surplus wine and using the spirit for industrial and similar purposes. Alcohol is thus utilised in many ways in Germany—as a motive power and for heating, lighting, etc.—and for some time the employment in industry of alcohol rendered unfit for drinking, corresponding to the methylated spirit in this country, has attracted more and more the attention of economists in France.—*Wine Trade Review.*

Artificial Manures.

The annexed list showing the agents from whom the various artificial manures may be obtained, and the current prices, is publiseed for the information and guidance of agriculturists.

Full particulars as to the composition of the respective fertilizers can be obtained on application to the agents; and attention is also invited to the analyses published in the *Agricultural Journal* of 9th January, 2nd April and 11th June, 1896; 30th Sept., 1897; 27th Oct., 1898; 13th Agril, 6th July, 1899 and 18th July, 1901.

LIST OF FERTILIZERS.

Attwell & Co., Cape Town. (Agents for Alex. Cross & Sons, Ltd., Glasgow.)	Special Root Guano ..	£6	10	0	per ton of 2,000 lb.
	Potato and Grain Guano ..	8	5	0	,, ,,
	Nitrate of Soda	12	0	0	,, ,,
	Superphosphates 39/40 per cent ..	6	0	0	,, ,,
	Scotia Basic Slag (cont. 30 per cent. Tribasic Phosphate of Lime)	4	15	0	,, ,,
	Sulphate of Ammonia ..	0	19	6	per 100 lb.
	(Prices free on trucks, Cape Town)				
Jas. Searight & Co., Cape Town.	No. 1 Superphosphates ..	£5	0	0	per ton of 2,000 lb.
	(containing 12·14 per cent. Phosphoric Acid soluble in water, being equal to 26·30 per cent. Tribasic Phosphate of Lime). ..				
	No. 2 Superphosphates ..	5	10	0	,, ,,

Jas. Searight & Co., Cape Town.	(containing 14·16 per cent. Phosphoric Acid soluble in water, being equal to 30·35 per cent. Tribasic Phosphate of Lime). ..	
	No. 3 Superphosphates ..	£6 0 0 per ton of 2,000 lb.
	(containing 17·18 per cent. Phosphoric Acid soluble in water, being equal to 37·39 per cent. Tribasic Phosphate of Lime). ..	
	Vine Fertilizers	9 0 0 ,, ,,

A reduction of 5s. per 2,000 lbs. is allowed on orders of 100 bags or more. Special rates can be arranged if delivery is taken ex importing steamer, the goods being trucked at Docks.

Woodhead, Plant & Co. Cape Town.	Thomas' Phosphate Powder	£4 15 0 per ton of 2,000 lb.
	Superphosphates	5 15 0
	Nitrate of Soda	14 0 0
	Muriate of Potash	16 0 0
	Sulphate of Potash	16 0 0
	Wheat Fertilizer	8 10 0
	Kainit ..	4 15 0
	Potato ..	1 15 0 per 200 lb.
	Vineyard Manure	1 15 0 ,,
	Tobacco Manure	1 15 0 ,,
	Sulphate of Ammonia	1 2 6 per 100 lb.
	Subject to a discount for cash.	
De Waal & Co., Cape Town.	Jadoo Fibre	10s. 6d. per bale of 100 lb.
White, Ryan & Co., Cape Town.	Potato, Vegetable and General garden	£8 10s. per ton of 2,000 lb. If less than ½ ton 18s. 6d. per bag of 200 lb.
	Pure Ground Bone	£6 10s. per ton of 2,000 lb. If less than ½ ton 13s 6d. per bag of 200 lb.
White, Ryan & Co., Cape Town.	Quick-acting Bone and Potash Mixture	£7 per ton of 2,000 lb. If less than ½ ton 16s. per bag of 200 lb.
	Selected Bone Meal for Cattle, Horses, Pigs and Poultry ..	15s. 6d. per 100 lb.; special price per ton.
	Bone Grit for Fowls ..	12s. 6d. per 100 lb.
	Superphosphates ..	Wholesale only.
Malcomess & Co., E. London.	"Malcomess" A. Fertilizer, for Potatoes, Mealies, Vegetables, Orange and other trees ..	£9 per ton of 2,000 lb.
	"Malcomess" B. Fertilizer, for cereals, especially wheat ..	£9 per ton of 2,000 lb.
	Accompanied by guaranteed analysis by Prof. Hahn * ..	(less 5 per cent for cash).
James Flower & Sons, Cape Town.	"H.B.T." Gypsum	£3 10s. per ton of 2,000 lb.
	Pure Ground Bone Meal	£8 10s. ,, ,, (in bags f.o. trucks—Cape Town).
Government Guano :—	Ordinary Guano	£6 10s. per ton of 2,000 lb. or 13s. per bag of 200 lb.
	Rock Guano	£6 17s. per ton of 2,000 lb. or 13s. 9d. per bag of 200 lb.

For use within limits of Colony.
Price includes delivery at Cape Town Railway Station.

GOVERNMENT NOTICES.

Farmers' Apprentices. Dairy Assistants, &c.

As inquiries are from time to time received from young men from abroad as to where they may serve apprenticeship or gain practical experience of farming in this Colony, before starting on their own account, the Secretary for Agriculture invites Farmers who are willing to receive young men of good character, for this purpose, to register their names with the Under Secretary for Agriculture, stating the class of farming they do, how many young men they are prepared to take, and for what period they would enter into an agreement.

It is not probable that these young men will be in a position to give more than their free services in return for the experience they will gain; that is, they will not be able to pay any fee; and they will look to receiving free board and lodging in return for their services.

It is to Farmers, therefore, who are willing to grant such young men free board and lodging in return for services rendered, that this application is especially addressed.

With reference to the above notice to Farmers, the Secretary for Agriculture now invites young men who are willing to engage themselves as Farmers' Apprentices in Cape Colony to register their names with the Under Secretary for Agriculture, Cape Town. The apprentice will gain experience in farming in South Africa, and have an opportunity for spying out the land before starting on his own farm. To the new comer from another country this is essential, for he has much to learn and unlearn.

Many applications for such Apprentices have been received from Farmers in the Colony. It will be noted that the Apprentice will neither receive wages, nor pay a fee. He will get free board and lodging in return for his services, and at the same time acquire the experience he is in need of.

Applications for employment have also been received from several Lady Dairy Experts and Dairy Assistants; and Dairy Farmers and others desiring to avail themselves of the services of such are invited to register their names with this Department, giving particulars as to situation and extent of operations, etc., and salary and other emoluments they are prepared to offer.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM BASUTOLAND.

By command of His Excellency the Governor, the following Proclamation No. 164, 1901, was published in the Government Gazette of October 29th, 1901:—

Whereas by Proclamation No. 100, bearing date the 4th day of June, 1901, I did, by reason of the existence of the disease amongst cattle known as Rinderpest in the Territory of Basutoland, prohibit the introduction of horned cattle from the said Territory into this Colony:

And whereas the said disease has spread to the portions of this Colony which adjoin the said Territory, thus rendering it unnecessary to longer maintain the prohibition imposed by the said Proclamation:

Now, therefore, under and by virtue of the powers and authorities in me vested, I do hereby proclaim, declare and make known that from and after the date hereof the prohibition upon the introduction of horned cattle from Basutoland into this Colony shall be removed: the said Proclamation No. 100 of 1901 being hereby repealed accordingly.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM ORANGE RIVER COLONY AND THE TRANSVAAL.

By command of His Excellency the Governor, the following Proclamation No. 139 1901, was published in the Government Gazette of August 16th, 1901:—

Under and by virtue of the powers vested in me by the "Animal Diseases Act," No. 27 of 1893, and by the "Animals Diseases Rinderpest Amendment Act," No. 2 of 1897, I do hereby proclaim, declare and make known that it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced into any part of this Colony from the Orange River Colony and the Transvaal, save and except such cattle as may be required to be introduced by the Government for the purpose of supplying Bile or Serum for inoculation against Rinderpest:

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed

And I do hereby further declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

Proclamation No. 217, bearing date the 29th day of October, 1900, together with the regulations issued thereunder, is thereby repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined Regulation for checking the spread of the infection is republished.

REGULATION ISSUED UNDER PROCLAMATION No. 30, DATED 20TH JANUARY, 1899.

Whenever under the provisions of Sections 11 and 12 of Act No. 27 of 1893, any area is declared or proclaimed to be an area infected with Rinderpest, it shall not be lawful for any person, animal, animal produce, article or thing, who or which may, in the opinion of the Magistrate of the District in which such area is situated, be liable to convey infection of Rinderpest, to leave or to be removed therefrom.

Inoculation Against Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of the Colony, it is desirable to inform stock-owners of the intentions of the Government as to dealing with the outbreak should it unfortunately become general in the Colony, and to advise stock-owners as to the best course to follow.

The Government propose that, as a general rule, cattle-owners themselves should perform the inoculation. Glycerinated Bile will be used, though circumstances may arise where it will be preferable to use Serum.

Bile Stations will be established in suitable places as necessity arises in localities where farmers have agreed to contribute the required proportion, say 5 per cent., of their cattle for production of the bile. It must be clearly understood that unless farmers are prepared to thus contribute the necessary cattle, it will be impossible for them to have the benefit of a Bile Station.

Glycerinated Bile will be issued free to contributors in proportion to the number of cattle contributed to a Bile Station. To non-contributors a fair charge will be made for bile if any be available for issue.

Serum will be charged for at the rate of £1 per bottle of ten doses.

A limited supply of Glycerinated Bile to meet emergencies will, for a time, be available, free of charge, from the Bile Station which has been established under arrangements with the Imperial Military authorities near Aliwal North.

As occasion requires, Demonstrators will be sent to instruct farmers in the method of inoculation, free of charge. They will, as a rule, inoculate only enough cattle to show how it is to be done, leaving the owner to continue the work. The Government will supply syringes on application to the Resident Magistrate, or to the Demonstrators at the following charges :--20 cc. capacity, 20s ; 10 cc. capacity, 15s. This payment may be recovered on return of the syringe to the Magistrate, in good order.

After the experience gained during the outbreak of 1896-1898, the Colonial Veterinary Surgeon wrote* as follows :—

"The method of inoculation which I would recommend in future sporadic outbreaks of the disease is briefly as follows :—

" *Infected Herds.*—These should be inoculated at once with either serum or glyceri-
" nated bile ; every animal which indicates infection by a rise of temperature should
" receive a large dose of not less than 100 cc. of serum, or 30 cc. of glycerinated bile ;
" the latter should, by preference, be injected into the jugular vein, so as to secure its
" immediate action. Then from eight to twelve days after, all the animals in the herd
" which give no indication of being infected with the disease, or fever temperature,
" should receive an injection of pure bile ; not less than 10 cc., and for large animals
" 20 cc. This will confer a lasting immunity sufficient for all practical purposes.

" *Clean Herds.*—When it is decided to inoculate a clean herd, which is in danger of
" becoming infected through its proximity to diseased cattle I would recommend that
" the animals composing the herd should be inoculated first with 20 cc. of glycerinated
" bile, and to follow this inoculation in from eight to twelve days with an injection of
" from 10 to 20 cc. of pure bile. This will confer a strong and lasting immunity on the
" animals in the herd, and will be free from risk arising from the inoculation or of
" introducing the disease.

" *Use of Pure Bile.*—Pure fresh bile should not be used in an infected herd, if any
" of the other inoculating materials can be obtained, as it tends to intensify the
" character of the disease in those already infected, and its immunising effect is too
" slowly developed to protect the healthy cattle against infection, if they are left in
" contact with those already sick. If no other means are available, however, the
" temperatures of the whole of the cattle in the infected herd should be carefully taken
" by the clinical thermometer, and only those which register a normal temperature
" should be inoculated with pure bile, the others should be separated from the inoculated
" lot at once, and carefully tended. If glycerine can be obtained, the spare bile should
" be mixed with it in the proper proportions—one part of glycerine to two parts of
" bile. This mixture, after standing forty-eight hours, may be injected into the affected
" animals in large doses, not only with safety, but with marked benefit.

" *Preparing the Bile.*—The bile should be taken from an affected animal immedi-
" ately after death, or from one which is killed in the last stage of collapse.

" Biles of all shades of colour—except those which are red from the presence of
" blood—may be used, so long as they are clear and free from a putrid smell. Thin
" light yellow biles should also be rejected.

" All the galls extracted at one time should be mixed together, after standing sepa-
" rately for twelve to eighteen hours, so as to render them uniform in strength and
" immunising properties. Pure bile should be used on the second day after being
" drawn, unless it is kept in an ice chest, when it may be kept sweet much longer. But
" if pure bile is used as a second inoculation only, as above directed, it is not desirable
" to keep it longer than twenty-four hours.

" Glycerinated bile is made by adding one part of glycerine to two parts of bile, stir
" the mixture well, then mix all the biles taken at one time, and allow them to stand
" for eight days. But if there is urgency, the glycerinated bile may be used forty-eight
" hours after it is mixed.

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* See *Agricultural Journal*, June 8, 1899, in which will be found a full consideration of the different methods of inoculation.

"I would strongly recommend that in every outbreak of the disease that occurs, every drop of suitable bile, obtained from the animals which die, should be mixed with glycerine in proper proportions, two parts of the bile to one of glycerine, so that it may be preserved and made available for the inoculation of infected herds, and also for the first inoculation of clean herds which may be considered in danger. Pure bile for the second inoculation of clean herds can always be obtained when the disease appears in any locality, which would be the only reason for inoculating clean herds in the immediate vicinity."

Taking the Bile.—To remove the bile the animal must be laid on its left side, the skin and flesh on the right side immediately behind the last rib being cut through; the ribs being raised, the gall bladder will become visible. The gall bladder should be then punctured with a small knife and the gall allowed to escape into a wide-mouthed bottle. If wide-mouthed bottles are not available then ordinary whisky bottles may be used with an *enamelled* funnel, which can be procured at any country store. Every precaution must be taken that the operation is performed in a thoroughly clean manner, the hands of the operator and all knives, &c., being thoroughly cleansed before use.

Inoculating.—After having secured the animal to be operated upon, the necessary dose of bile is injected under the skin of the dewlap by means of a Hypodermic Syringe, care being taken that the point of the needle is not inserted into the flesh, but between the skin and flesh.

Symptoms of Rinderpest.

The Outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined description of the symptoms of Rinderpest is hereby published:—

The early symptoms of Rinderpest are a rise of internal temperature to 106 or 107° Fahr.; the animal stands with its head hanging down, ears drawn back and coat staring; it refuses all food and occasionally shivers. A mucous discharge flows from the eyes and nostrils; the extremities are cold, and the breathing is laboured and frequently accompanied with moaning. The inner part of the upper lip and roof of the mouth and all visible mucous membranes are reddened, and covered with an eruption of minute pimples, and later with a branlike exudation. The bowels are occasionally constipated, but in most cases diarrhœa sets in, the evacuations being slimy and very frequently of a dirty yellow colour. The prostration of strength is great, the animal staggering when made to move. In milch cows the secretion of milk is rapidly diminished, and soon ceases altogether. The disease usually ends fatally in from six to ten days.

It is generally believed that the infection is produced through the respiratory organs; from there the contagion becomes generalised. The contagion exists in the secretions and excretions, urine, saliva, mucous secretions of the nose, mouth and eyes, in the sweat, expired air, blood, and in all the tissues. It may be conveyed directly by the diseased animals, or indirectly by the dung, the bedding, the earth, hides, wool, meat, clothing, wagons or vessels, by people, dogs, sheep and chickens, &c. Contagion takes place only through short distances. When the weather is dry this is reduced to its minimum (about 27 yards), and the progress of the disease may be stopped by a ditch separating the diseased from the healthy animals.

In order to detect the earliest symptoms of Rinderpest, owners of horned cattle are warned of the urgent necessity for keeping a constant and close watch upon their stock. Any suspicious cases should be immediately reported to the nearest Resident Magistrate, Field-cornet or Police Officer, and the sick animal kept separate till an inspection is made. Stock should be carefully examined daily by a responsible person, more particularly for any symptoms resembling those above described.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October, 1900:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

- (*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and
- (*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie

Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B' hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz.:—

Number and general description of Cattle } ....
Owner's name and address } ....
In charge of..
Place to which Cattle are being sent..
(Signature)..
(Address)..
Date..............

SCHEDULE B.

(*Endorsement to be made by the Inspector.*)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature.
(Address).
Date.....................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle } ....
Owner's name and address } ....
In charge of..
Place to which Cattle are being sent..
(Inspector's signature)..
(Address).............
Date..................

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Seed Wheat.

A small consignment of "Red Egyptian" Seed Wheat has been imported by the Government for experimental sowing with a view to ascertaining its suitability as a rust-resistant wheat as well as its milling qualities.

This wheat will be distributed in lots not exceeding 100 lb. to any one person, upon deposit of a sum at the rate of 10s. per 100 lb., and the amount so paid will be refunded to all those applicants who furnish a full report, upon a printed form which will be supplied to them, showing the result of the trial.

Applications should be addressed to the Under Secretary for Agriculture, Cape Town, and must be accompanied by a remittance (by P.O. Order, Postal Note, Bank Draft or Cash) for the amount of the deposit.

As the consignment is a small one, early application should be made.

Tobacco Seed.

A small consignment of the following varieties of Tobacco Seed, viz.:—White Burley Havana, Yellow Oronoko, Virginia "One Sucker," Virginia Pryor, Blue Pryor, Connecticut Seed Leaf, and Maryland, have been obtained from America by the Agricultural Department. Sumatra, Long Leaf Gooch and St. Felix are shortly expected.

Applications, accompanied by the deposit of 5s., should be addressed to the Under Secretary for Agriculture, Cape Town; and will be dealt with in order of receipt.

The seed will be distributed in lots not exceeding 3 oz. each of any three of the above-mentioned varieties upon deposit of the sum of 5s. by each applicant, which amount will be refunded by the Government to all applicants who furnish a report in due course, giving full particulars as to the mode of cultivation adopted and the results obtained.

RAINFALL, JANUARY, 1902.

NOTE: n.r. denotes that, up to the date of publication, Returns have not been *received* from those Stations.

	INCHES.
I. CAPE PENINSULA:	
Royal Observatory (a) 12 inch gauge	0·58
Cape Town, Fire Station	0·69
Do. South African College	0·78
Do Sea Point (Hall)	0·59
Do Molteno Reservoir	0·71
Do Platteklip	1·07
Do Signal Hill	0·59
Table Mountain, Disa Head	1·21
Do Kasteel's Poort	1·85
Do Waai Kopje	2·80
Do St. Michael's	2·13
Devil's Peak, Block House	1·74
Do. Nursery Gauge	1·14
Do. Lower Gauge	0·57
Rondebosch	0·77
Newlands (Montebello)	n.r.
Bishopscourt	n.r.
Claremont	0·70
Kenilworth	0·76
Wynberg (St. Mary's)	0·94
Groot Constantia	1·18
Tokai	1·09
Simon's Town (Wood)	1·30
Do. (Gaol)	1·16
Blaauwberg Strand	0·37
Robben Island	0·87
Strandfontein	0·49
Camp's Bay	0·52
Mouille Point	n.r.
Fish Hoek	1 01
Cape Point	0·27
Smith's Farm	n.r.
Durbanville	n.r.
II. SOUTH-WEST:	
Eerste River	n r.
Klapmuts	0·88
Stellenbosch (Gaol)	0·85
Somerset West	1·09
Paarl	1·56
Wellington (Gaol)	1·15
Do. (Huguenot Seminary)	n.r.
Tulbagh	0·95
Kluitjes Kraal	0·77
Houw Hoek	n.r
Ceres	1·80
Rocklands	n.r.
Caledon	0·75
Worcester (Gaol)	0·23
Do. (Meiring)	n.r.
Do. (Station)	0·14
Hex River	0·05

	INCHES.
II. SOUTH-WEST—*continued.*	
Lady Grey (Div. Robertson)	0·14
Robertson	0·40
Do. (Govt. Plantation)	0·35
Groot Drakenstein	0·89
Montagu	n.r.
De Hoop (Div. Robertson)	0·53
The Oaks	n.r.
Rawsonville	0·56
Weltevreden (Div. Caledon)	n.r.
Do. (Morton)	1·38
Danger Point	0·96
De Doorns	0·00
Ceres Road	0·53
III. WEST COAST:	
Port Nolloth	0 00
Do. (Howard)	n.r.
Klipfontein	0·00
Kraaifontein	n.r.
O'okiep	n.r.
Springbokfontein (Gaol)	0 00
Concordia	0.00
Garies	n.r.
Kersefontein	0·25
The Towers	0·35
Dassen Island	0·32
Malmesbury	0·59
Piquetberg	0·83
Do. (Road)	0 45
Van Rhynsdorp	n.r.
Clanwilliam (Gaol)	n.r.
Do. (Seydell)	0 20
Welbedacht	n.r.
Hopefield	0·31
Lilyfontein	n.r.
Wupperthal	0·00
Zoutpan	0·30
Anenous	n.r.
IV SOUTH COAST:	
Cape L'Agulhas	0·72
Bredasdorp	0·85
Swellendam	1·01
Heidelberg	0·35
Riversdale	0 14
Zuurbraak	1·57
Dumbie Dykes	0·44
Mossel Bay	0·58
George	1·99
Ezeljagt	
Millwood	2·97
Sour Flats	3 57

IV. SOUTH COAST—*continued.*	INCHES.
Concordia	3·27
Knysna	2 04
Buffels Nek	3·35
Harkerville	2 79
Plettenberg Bay	1·92
Forest Hall	1·23
Blaauwkrantz	2·67
Storm's River	4·60
Witte Els Bosch	4·21
Humansdorp	1 30
Cape St. Francis	1·75
Hankey	0 65
Witteklip	n r.
Van Staaden's (upper)	1·19
Do. wer)	1 09
Uitenhage	0·19
Do. (Inggs)	n.r
Dunbrody	n.r.
Port Elizabe Harbour)	0·48
Walmer Hei (near Port Elizabeth)	1 29
Tankatara	0·53
Lottering	3 14
Shark's Rive ursery)	0·87
Do vict Station)	0 87
Grootvader's Bosch	1·45
Karnmelks River	0·90
Armadale	0·27
Vogel Vlei	0·50
Victoria Park, P.E.	0·74
Great Brak River	0·43
Melkhoutfontein	0·87
Uitenhage Park	0·80
Centlivres	0·31
nhage)	0·45

V. SOUTHERN KARROO:	
Touws River	0·08
Ladismith	0·19
Amalienstein	0·48
Calitzdorp	0·00
Oudtshoorn	0·00
Vlakte Plaats	0·18
Uniondale	0·00
Kleinpoort	n.r.
Glenconnor	n.r.
Triangle	0·00
Grootfontein	0 01
Pietermeintjes	0·00
Bok River	0·02
Verkeerde Vlei	0·03
Seven Weeks Poort	0·21

L KARROO:	
Matjesfontein	0·00
Prince Albert Road	0·00
Fraserburg Road	0·00
Prince Albert	0·00
Zwartberg Pass	1·12
Beaufort West	0·00
Dunedin	n.r.
Nel's Poort	0·00
Camfer's Kraal	0·09
Lower Nel's Poort	0·00

VI. W.C. KARROO—*continued.*	INCHES.
Baaken's Rug	0 00
Willowmore	0·01
Steytlerville	0·00
Roosplaats	n.r.
Laingsberg	0·00

VII. EAST CENTRAL KARROO:	
Aberdeen (Gaol)	0·24
Do. (Bedford)	0·26
Aberdeen Road	0 28
Rietfontein	0·85
Winterhoek	n.r.
Klipdrift, De Erf	n.r.
Kendrew	0 00
Graaff-Reinet	0 09
Do. (College)	0·06
New Bethesda	0 32
Roode Bloem	0·17
Wellwood	n.r.
Do. (Mountain)	n.r.
Jansenville	0·07
Patrysfontein	n r.
Toegedacht	0 00
Klipfontein	0·08
Cranemere	0·00
Pearston	0·10
Walsingham	0 08
Somerset East	1·05
Do. (College)	1·13
Longhope	0.00
Middleton	n.r.
Corndale (Div. Aberdeen)	n.r.
Cookhouse	n.r.
Doornbosch, Zwagershoek	n.r.
Middlewater	0·32
Darlington	n.r.
Bloemhof	0·50
Arundale	0·28
Graaff-Reinet (Engineer's Yard	0·05
Glen Harry	n.r.
Roode Hoogte	n.r.

VIII. NORTHERN KARROO	
Calvinia	n.r.
Middlepost	n.r.
Sutherland	n.r.
Rheboksfontein	n.r.
Fraserburg	n.r.
Onderste Doorns	n.r.
Droogefontein	0·49
Gannapan	n.r.
Carnarvon	0·02
Wagenaar's Kraal	0·80
Brakfontein	n.r.
Vogelstruisfontein	0·00
Victoria West	0·00
Britstown	0·00
Murraysburg	n.r.
De Kruis	n.r.
Richmond	n.r.
De Aar	0·27
Middlemount	n.r.
Hanover	0·50
Philip's Town	0 54
Boschfontein	0·19

VIII. N KARROO—*continued.*	INCHES.
Petrusville	1·06
The Willows	n.r.
Naauwpoort	0·09
Middelburg	0·00
Colesberg	0·24
Tafelberg Hall	n.r.
Rietbult (Colesberg Bridge)	1·02
Stonehills	0·20
Cradock	0·54
Do. (Rose)	0·13
Varsch Vlei	n.r.
Witmoss	0·51
Steynsburg	0·96
Do. (Nesemann)	0·92
Daggaboer's Nek	1·40
Springfield	n.r.
Quagga's Kerk	n.r.
Tarkastad	2·20
Drummond Park	1·74
Riet Vlei	1·17
Brand Vlei	n.r.
Williston	n.r.
Omdraai's Vlei	n.r.
Zwagersfontein	n.r.
Varken's Kop	0·09
Culmstock	n.r.
Doorskuilen	0·00
Houwwater Dam	n.r.
Hillmoor	0·36
Glen Roy	2·41
Fish River	n.r.
Spitzkop	n.r.
Phizantefontein	n.r.
Biesjesdam	0·00
Groot Vlei (Theebus)	n.r.
Kleinhaasfontein	1·39
Spring Valley	0·50
Beyersfontein	n.r.
Zeekoegat	0·04
Haasfontein	0·36
Maraisburg	0·56

IX. NORTHERN BORDER:	
Pella	n.r.
Kenhardt	n.r.
Van Wyk's Vlei	n.r.
Prieska	n.r.
Dunmurry	n.r.
Griqua Town	n.r.
Campbell	1·64
Douglas	n.r.
Avoca (Herbert)	1·37
Eskdale	1·41
Hope Town	1·87
Orange River	1·07
Newlands (Div. Barkly West)	5·39
Groot Boetsap	n.r.
Kimberley (Gaol)	4·05
Do. (Stephens)	4·62
Bellsbank (Div. Barkly West)	n.r.
Grootdrink	n.r.
Barkly West	6·20
Upington	n.r.
Trooilapspan	n.r.

IX. N. BORDER.—*continued.*	INCHES.
Rutland	n.r.
The Halt	0·45
Karree Kloof	1·26
New Year's Kraal	1·10

SOUTH-EAST:	
Varken's Kuil (Div. Bedford)	n.r.
Fairholt	0·88
Cheviot Fells (Bedford)	n.r.
Alicedale	n.r.
Bedford (Gaol)	1·99
Do. (Hall)	2·07
Sydney's Hope	1·43
Cullendale	n.r.
Adelaide	1·29
Atherstone	1·20
Alexandria	0·84
Salem	0·70
Graham's Town (Gaol)	1·32
Do. (Bact.Inst.)	1·23
Heatherton Towers (near Graham's Town)	0·24
Fort Beaufort	1·79
Katberg	n.r.
Do. Sanatorium	4·50
Balfour	2·62
Seymour	2·31
Glencairn	2·51
Alice	2·08
Lovedale	n.r.
Port Alfred	1·63
Hogsback	n.r.
Thaba N'doda	n.r.
Peddie	0·80
Cathcart	3·06
Keiskama Hoek	1·26
*Crawley	n.r.
Thomas River	n.r.
King William's Town	1·60
Do. Hospital	2·21
Stutterheim (Wylde)	2·05
Do. (Besté)	1·91
Dohne	n.r.
Lyndoch	0·95
Kubusie	n.r.
Blaney	n.r.
Kei Road	n.r.
Evelyn Valley	n.r.
Berlin	n.r.
Isidenge	n.r.
Perie Forest	n.r.
Quacu Forest	n.r.
Kologha	n.r.
Fort Jackson	1·66
Komgha	2·39
Prospect Farm (Div. Komgha)	2·46
Hopewell Do.	n.r.
East London, West	2·69
Do. East	n.r.
Fountain Head	n.r.
Fort Cunynghame	n.r.
Bolo	n.r.
Fort Fordyce	n.r.
Exwell Park, Waku	n.r.

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*Gauge transferred from Dynamite to adjoining farm at Crawley.

X. SOUTH-EAST—*continued*.	INCHES.
Melrose	0·27
Sunnyside	0·85
Chiselhurst	2 10
Sterkspruit	n r.
Scott's Bottom	0·95
Dontsah	n.r.
Wolfridge	n r.
Cata	n.r
Forestbourne	4·07

XI. NORTH-EAST:	
Venterstad	0 15
Ellesmere	0·64
Burnley, Cyphergat	n.r.
Burghersdorp	0 78
Do. (Le Roex)	n.r.
Molteno Station	n.r.
Cyphergat	2·46
Thibet Park	n.r
Sterkstroom	1·35
Do. (Veitch)	n.r.
Rocklands	n.r
Aliwal North (Gaol	1·85
Do. (Brown)	2·14
Rietfontein	1·30
Buffelsfontein	n.r.
Hex's Plantation	n.r.
Carnarvon Farm	1 29
Jamestown	2·20
Queenstown (Gaol)	0·75
Do. (Beswick)	n.r.
Dordrecht	n.r.
Tylden	1·60
Snow Hill	n.r.
Herschel	2·24
Lady Grey	2·26
Bolotwa (Contest)	n.r.
Lady Frere	0·61
Avoca (Div. Barkly East)	n.r.
Kellands	0·68
Barkly East	n.r.
Glenlyon	n.r.
Gateshead	n.r
Lyndene	0·80
Mooifontein	0·31
Poplar Grove	1·58
Biesjesfontein	n.r.
Whittlesea	1·27
Blikana	2·60
Doornkop	1·06
Halseton	1·06

XII. KAFFRARIA:	
Slaate, Xalanga	n.r.
Ida, Xalanga	n.r.
Cala, Xalanga	n.r.
Cofimvaba	3 12
Nqamakwe	1 68
Main	n.r.

XII. KAFFRARIA—*continued*	INCHES.
Engcobo	1·71
Butterworth	0·82
Kentani	0·75
Maclear	n.r.
Idutywa	2·80
Willowvale	2·44
Mount Fletcher	0·16
Elliotdale	1·14
Mqanduli	1·06
Matatiele	n.r.
Umtata	1·59
Qumbu	1·60
Kokstad	1·82
Port St. John's	n.r.
Umzimkulu	2 05
Woodcliff	3·24
Tabankulu	2·60
Kilrush	3·35
Somerville (Div. Tsolo)	1 63
Tsomo	2·25
Soteba	1·56
Flagstaff	3·01
Quebe ..	3 10
Insikeni	6 25
Bazeya	4.33

XIII. BASUTOLAND:	
Mafeteng	2·23
Mohalie's Hoek	2·95
Qacha's Nek	2 24
Moyeni Quthing	2 41
Teyateyaneng	6·31
Leribe	n.r.
Butha Buthe	n.r.
Maseru	n.r.

XIV. ORANGE RIVER COLONY:	
Bethulie	0·33
Kroonstad	3 42

XV. NATAL:	
Durban, Observatory	6·35

XVI. THE TRANSVAAL:	
Johannesburg (Park)	n.r.
Do. (Cemetery)	n.r.

XVII. BECHUANALAND:	
Vryburg	3·26
Taungs	3·64

XVIII. RHODESIA:	
Salisbury	9·70
Hope Fountain	8·17
Geelong	7·11
Chishawasha	11·16
Figtree Siding	6·91

THE

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Erratum.

Nine lines from the foot of page 301 of the *Agricultural Journal* of 27th ult. (No. 5, vol. xx.) the word "water" at the beginning of the line should read *air*.

The New Order.

A VISIT TO ELSENBURG COLLEGE.

BY A. R. E. B.

As I reached this educational home of husbandry at the close of of a sultry day a hearty greeting met me from Mr. Mason, the Principal of the College. I was just in time to meet the Government's chief Veterinary Surgeon, Dr. Hutcheon, as he came in from the lecture hall, where he had discoursed for several hours upon veterinary science to successive batches of students. If ever a man deserved the refreshment after labour that awaited him, he did. I was fortunate also in meeting, as a visitor, Mr. Claude Fuller, Govt. Entomologist of Natal.

So much has been written about Elsenburg that I would on this occasion like to avoid the threadbare description of the hundred and one industrial features of the place.

The soil and aspect of Elsenburg are well chosen and are so varied that no valid objection to the site can be made by the most captious critic in reference to the capabilities of the place for the end in view. The soil is nowhere so rich as to grow vegetation prolifically, so it follows that in most cases the technical skill and dexterity acquired by the student in the handling of natural and artificial manures will be needed in the reserved areas of the College. There are upland, vleiland, and a fair quantity of grazing land for horned stock, horses and sheep, and land suitable for the several classes of cereals, and a fair proportion adapted to the production of fruit trees and vines, and these are about all that can be desired even for an educational farm.

WORKERS AT ELSENBURG.

The Government was undoubtedly well advised when it this unique site. Unique because if the ancient owner of the old house and its surrounding tenant dwellings had purposely out his premises for their future adaptation as Agricultural College buildings he could scarcely have designed a better plan. The growth of the school and additions to its accommodation will probably never necessitate an alteration of the original ground plan but merely the addition of such dwellings as may be required for the accommodation of students beyond the present complement. There are 45 in quarters at present and there is accommodation for sixty.

A RUN ROUND THE FARM.

Accompanied by Mr. Mason I visited the different points of interest at the farm, and was much impressed with the perfect order, regularity and cleanliness that prevail everywhere.

The youthful farmers are trained to do one thing at a time and to do it well, and all along the line of departments, from the class-room to the pig-styes and dairy, the effect is noticeable.

Excellent water for the establishment is supplied by two windmills which pump from permanent wells.

Forty thousand vines are at present planted on American stock, all healthy and just beginning to bear. They cover 30 acres of ground. Mr. Mason said he hoped to be making some wine next year and that he could put another 200 acres under vines to great advantage, especially on the sloping land which surrounds the homestead lands.

A large number of healthy fruit trees are in a forward state, and some excellent plums of good varieties were *en evidence* during my visit.

The College has emerged from the chrysalis condition to one of comparative completeness, and it is creditable to the management that so much has been accomplished in so short a time on somewhat scanty material.

With the promising growth of an abundant yield of excellent wine-making crops the necessity of good cellarage is apparent, and the first cost, no matter how large if the need be real, of cool substantial walls and properly made roof and floors, with a provision of ample and suitable fustage, is sure to be, in the end, an economical one. This subject was apparently giving the principal some concern.

On looking at the class and lecture room I observed the nucleus of a technical museum. There was the usual Noah's Ark and a miscellaneous collection of cheap toy-like miniature implements, some flotsam and jetsam and a few oddments of a mixed order; but out of them all it is impossible to form a correct educational museum. It may be hoped that the authorities will bear with the students if they continue to call for an orderly collection of entomological, botanical and horticultural specimens, models of machinery and farm appliances. The lack of them is a drawback easily met by the expenditure of an insignificant amount of money. The museum is equally necessary to the lecturers for the illustration of lessons in plant or animal anatomy and the details of farm work.

There ought to be no delay in letting implement makers and agents know that they can, with advantage, send specimens of their machines to the college, so that they may be tested and reported on, and such of them purchased as may be necessary and useful. Machinery is going to play an important part in the agricultural affairs of this country, and the students, as they lay down their educational work and begin business as farmers, will readily be able to choose the proper implements and machinery through the instruction afforded them during their career at Elsenburg. Much good will also ensue through the use of up-to-date machines popularised in this way when the ex-student gets on his farm, because he will cause a healthy emulation on the part of his neighbours in the choice of the right implements and methods of using them. The principal's intention is to have regularly advertised trial days of machines and implements.

It has already been decided to at once introduce steam power for various implements at the College.

There are 200 acres under cultivation for grain crops and the usual garden products, such as pumpkins, melons, etc.

The Principal has wisely arranged for proper rotation of crops, and among the new fodder plants which he is introducing is the cow-pea and a few varieties of good drought-resisting beans.

Dr. Hutcheon, chief Government Veterinary Surgeon, having accomplished the importation to Elsenburg of pure-bred cattle of the very best quality, they are being used as the foundation for stock to work up from, and all of them are in thoroughly good condition.

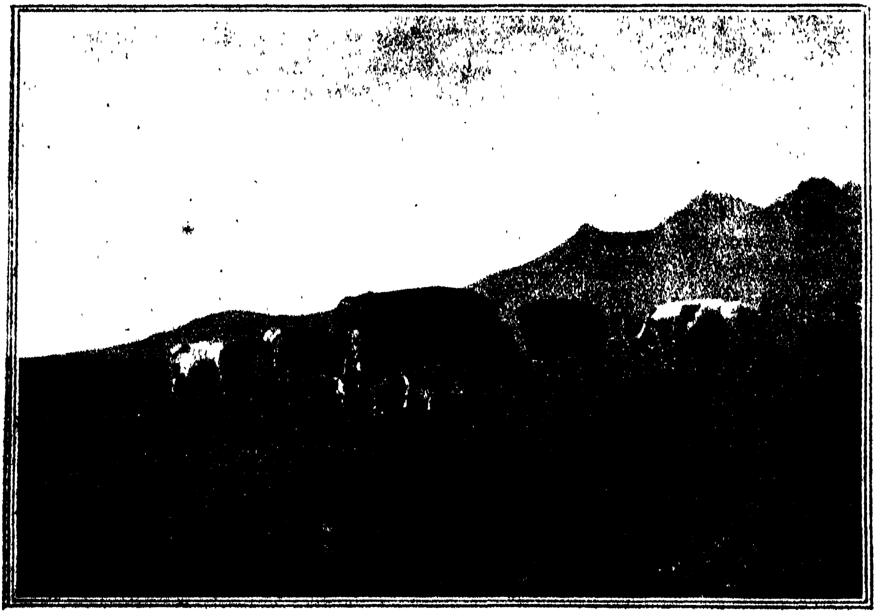
As we were going round the reserve Mr. Mason called my attention to a bright green patch of land some distance away on which pigs, fowls, ostriches and other animals appeared to be enjoying themselves immensely. The patch looked in the distance just like an emerald in light brown setting. On getting near it, I saw that it was a plot of Italian rye-grass, sown about 10 months ago. Mr. Mason imported the seed direct from England. It is a very vigorous and drought-resisting plant, and when everything else withers and dries it tenaciously preserves its verdancy and succulence.

The dairy instructor and overseer, Mr. Woodin, showed me everything in connection with his work. Among the poultry in his charge I noticed some very fine thoroughbred Aylesbury ducks, lately imported.

Besides his general oversight of everything that goes on at the College, the principal delivers lectures upon general agricultural stock farming and farm management and the keeping of accounts. The latter is, as all farmers know, an important subject. How few indeed are able to render at a moment's notice, or even in a week, an account or set of accounts that, under proper conditions such as Mr. Mason insists upon, should be in apple-pie order? I was appalled when he indicated to me the immense approximate loss that must accrue to the whole farming community through their inability or neglect to keep proper accounts.

Mr. F. T. Bioletti had just arrived from California to act as viticultural instructor. He has charge of the vineyards and orchards, and will deliver regular lectures on viticultural and fruit-growing subjects.

Then there are instructors in carpentering and engineering, and once a week Dr. Hutcheon comes up for a day or so and delivers his lectures, and Dr. Marloth, in another part of the week, lectures on chemistry, botany and surveying.



PRODUCERS AT ELSENBURG.

Everybody at the farm works in unison with friend and neighbour, and the visitor quickly notices this harmony. Two factors are mainly responsible for it, and, as usual in all things human, they are a man and a woman, the Principal of the College and the Matron. One I have referred to, and the other I want to convey an impression of, but to do so adequately is difficult. Mrs. Gray has been at Elsenburg from its inception and has seen and endured all its rough and tumble, I won't say with complacency, but with a determination to conquer for the sake of the work and the mothers' sons who required her help, that is truly British and matronly. Principal and matron have combined and succeeded in making this practical farming institution a veritable home from home for those who have wandered so far from parental homesteads. We believe it is generally known that Mrs. Gray is the widow of the Very Rev. Dean Gray, of cherished colonial memory. The Dean died prematurely and left his widow to battle for herself and her children. Possessed of a magnificent voice and natural musical talents high in order, had providence arranged differently Madame Gray and Madame Patti might have been contemporary goddesses of song. But the privacy and retirement of a country home where battle had to be done in humble fashion for daily bread, left the widow no chance of giving her talents to the world. At the present time, when her age is over sixty, this gifted lady sings the songs of the old and new order with the sweetness, clearness and volume of a Patti, and when this has been said about Mrs. Gray's accomplishments and her encounter, single-handed, for many years, with the hardships of colonial life, it is easy to imagine her influence at Elsenburg. I was present at two students' social evenings when the matron and her daughter, Miss Gray, who is visiting the farm, helped to give to everybody a pleasant time. The matron's conversation is most interesting as she tells her past experiences of students' garments that must be mended, stockings that needed to be darned, ailments that required motherly attention, and the preparation of the puddings that the "dear fellows" enjoyed so much, followed by the home-made tarts for lighter moments; all these with the ever-prevailing influence of her gentleness and occasional timely motherly reproof have combined to increase the manliness and self-respect of every man jack in the little community, and to give important aid to the onerous work of the principal himself. "Mrs. Gray leaves us in May, to go to Umtali with her daughter, who is to be married there, and what we are going to do without her, goodness only knows," quoth somebody at Elsenburg. It is to be hoped that when the new matron is being chosen Mrs. Gray will in the wisdom of the Education Department be asked to assist in the selection, for there can be no doubt that the social side of such an institution as this depends upon the civilising influence of the matron, and nobody knows better than Mrs. Gray the points in a woman that will spell the success or failure of her *régime* at Elsenburg.

On the first evening of my visit all the students who chose to do so foregathered in the drawing-room with their music and musical instruments, for a social hour. And now was emphasised a feature that was noticeable in the lecture hall, at leisure on the stoep, at work on the farm, and at dinner at the family board, namely, the complete harmony and good behaviour already referred to. Yet this company of robust young students have come together promiscuously from many parts of the globe, and are composed of the awkward elements that are known as Africander, Colonial, over-sea Colonist, and the newly arrived Englishman with his pride and exclusiveness. Some of them have served early apprenticeships on farmsteads at home in the old country, and would probably be capable of an immediate beginning in South Africa were the conditions entirely or even nearly on all fours with those of Europe, but they are not, and the two or three years that may be spent at Elsenburg will certainly be *well spent* and enable the new-comers to avoid the pitfalls into which many have blundered in the past.

QUERIES AND REPLIES.

Bone Manure.

Could you kindly supply the following information and greatly oblige ?

Do bones lose their chemical properties through lying for a long period on the veld ? If so, do "green" bones when ground lose their potency ? How long could bones lie without deterioration in quality ? My intention is to grind bones for stock and other purposes.

Could you tell me the best artificial manure to use on lucerne ? We know, of course, lucerne feeds largely on lime, potash, magnesium and phosphoric acid. In this part of the Karroo lime is in great abundance, but other constituents may be wanting, as far as lucerne is concerned.

Artificial manure can be used to advantage on most Karroo lands. How much do you consider should be put on per acre, and in what manner, broadcasted and then ploughed in, or put on surface of soil ?

N. N. W. LINDSAR.

Bones may be considered as consisting simply of lime-phosphate. Green bones have besides a small percentage of nitrogenous organic matter. No length of time or mode of keeping can do more than diminish this insignificant organic matter.

Bones are very slow in their action upon the soil, that is, they give up their phosphate slowly to the moisture therein contained, the rate depending almost entirely upon the degree of fineness to which they have been ground. Farmers have long ago found out that what used to be called inch and half-inch bones are of very little use at all. Hence they should always be very finely ground, and it is an advantage to boil green bone to get rid of the fat which would prevent the soil moisture from readily getting at it.

To get over the difficulty presented by this slowness of action, it has been customary to mix a proportion of sulphuric acid with the bone meal. The acid takes up some of the lime and leaves the remaining phosphate in a much more active and soluble manurial form, suitable for immediate absorption by the growing crop. Such superphosphate, as it is called, is applied either as a top dressing, say 2 cwt. per acre, or it is drilled shallowly into the tilth. The object is to get it near the surface so that it should not be too rapidly dissolved away and carried down out of the reach of the crop. I cannot say whether you would find the making of superphosphate pay you over at Hanover. The carriage of sulphuric acid, even of the dilute form made in this Colony, is somewhat risky and expensive. As you say, there is no lack of lime in Karroo soils generally, therefore I would not advise you or anybody else to buy Thomas' phosphate (basic slag) if you have a good supply of bones, because in the slag is from 25 to 30 per cent. of lime, and this you don't want.

With potash the case is different, and everything must depend upon the question whether your soil contains a fair percentage of potash already. Analysis only can determine that, and I think it might be worth while if you take this precaution to have not only your soil analysed for potash, but also your average kraal manure, which often contains a good deal. Of course, I don't mean the wretched sun-dried, rain-leached top stuff from old kraals of ten years ago, but good manure of recent deposit. But under any circumstances you would find it well worth while, particularly on potato ground, to make the experiment on a strip of, say, three or four rows, by giving a light dressing of kainit, which contains a little over 20 per cent. of sulphate of potash. In the special case of potatoes, you might give the dressing to the up-cast of the trench and then turn the whole over on the setts. You would thus in one season determine whether the greedy potato has got all he wants in the way of potash from the soil, or whether he is open to take another lot artificially and profit by it. In the Karoo you generally have quite enough lime in the soil to supply all that a stand of lucerne requires.

The great thing to be wished in its cultivation here is that farmers would encourage the plant's natural propensity to root down to an enormous depth by much deeper ploughing than they usually think sufficient. After a fair start in this way the roots often penetrate the subsoil to a great depth. But the *deeper the tilth the better and longer the lucerne will stand*, and the more staying power it will have against drought and the less need it will have of irrigation. I think you are likely to get all the potash you want out of first-class kraal dung, and with this you will be doing good by the vegetable humus of the dung assisting in making the soil more friable. Of course, you know that lucerne clovers and the like don't want nitrogen; they collect it themselves from the soil by the tubercles on the roots. E.P.

Apple Disease.

By parcel post I send to you a tin containing two diseased apples. I shall be glad to know the nature of the disease and the best remedies to apply. I have half a dozen trees similarly affected. They were all heavily laden with fruit, but it has all dropped before maturity. The fruit was somewhat knocked about by hailstones, but I do not think the pitting, which is evenly distributed around the apples and appears in places the hail could not possibly have reached, can be due to this. ERNEST E. GALPIN.

The disease with which the apples submitted by correspondent are affected is well known to culturists all over this country, but as yet the cause is not known. Many attribute it to the action of water after heat. It is also generally more pronounced in young trees and only in certain sorts of apples. After the tree becomes older the fruit no longer becomes affected.

It is not the result of a fungus nor yet of an insect. I regret that I cannot suggest any remedy other than sufficient drainage of the ground in which the trees grow. E.P.

Imported Cattle.

We have received from Mr. J. Martin, Bog Farm, Walmer, Port Elizabeth, some interesting particulars of his farm and stock. He speaks of the cattle that have recently been landed from Australia and regrets the fate that befell most of them. In reference to Mr. Martin's remarks on this point it is interesting to note what Dr. Hutcheon says, as follows, viz:—

With respect to the diseases which affect cattle shortly after their arrival at Port Elizabeth, these are not confined to imported stock, but affect to an equal degree cattle drawn from any of the inland districts of the Colony or from Cape Town. They are (a) a form of gall-sickness, or acute derangement of the digestive organs, (b) Red-water, and (c) a disease peculiar to certain portions of the East Coast districts, which Dr. Edington's experiments led him to describe as closely related to Heart-water in sheep, but its pathology and treatment have not yet been worked out.

I have just received a report from Veterinary Surgeon Freer, of Uitenhage, which runs as follows:—"From the 22nd November to end of the month I was engaged in investigating the cause of death of all but six of the forty-two cows landed from Australia at Port Elizabeth in September, and the result of these investigations is that I am convinced that the majority of these cows died of Red-water, both at Port Elizabeth and Uitenhage." D. HUTCHEON.

The Egyptian Goose (*Chenalopex Ægyptien*).

I have a pair of the above geese, very tame, which swim about and eat their food along with the common domestic ducks. Is there any experience of their having been domesticated anywhere, or their having bred and laid eggs when in a tamed or domesticated state? I shall be very glad to be informed on these points. By "domesticated" I do not mean merely "tamed," but being rendered members of the poultry yard in the hereditary sense.

A. D. C.

If any of our readers have any experiences bearing upon the above query we shall be glad to publish them.—EDITOR.

Blow Flies and Sore Eyes.

With regard to the query of Mr. George Blaine, *vide Agricultural Journal*, 30th January:—

To prevent blue-bottle flies "blowing" sheep, I would suggest that he first washes out the wounds clean, with carbolic mixture, and then dust in *Iodoform powder*, this is best done by filling a small insufflator (such as are sold for use with Keating's Powder answers very well) and *blowing* the powder into the wound. He would find two of these very useful—one filled with Iodoform and the other with Boracic Powder; the latter I used to find most useful for treating sheep with sore eyes—a disease which I know troubles sheep farmers in the Eastern Province a great deal, and causes numbers sometimes to go blind. A usual way amongst the farmers is to put in gunpowder, but the treatment by means of Boracic Powder, blown in with one of these small insufflators, was given to me by Dr. Hutcheon some years since, when I showed him some 300 sheep with bad eyes, and is a most humane and *successful* way of treating this common disease.

GEO. H. STONEY.

In cases where the film on the eyes becomes very persistent a little calomel blown into the eyes often acts when other dressings fail.

D. H.

COUNTRY REPORTS.

Bizana.

MAJOR H. SPRIGG, R.M., 31st Jan., 1902.—The weather has still been very wet; rain falling more or less on 20 days during the month, sometimes nearly all day and night, but not so heavily as during the former months. There has been very little sunshine and the crops are suffering from the want of it. Pasturage is growing too rank everywhere. Stock doing fairly well, but to some extent kept down in condition by the excessive rains. There has been some sickness amongst horses but not very much.

Butterworth.

J. M. YOUNG, Acting R.M., 1st Feb., 1902.—There is little to add to my report for the month of December. Dry weather still continues, and unless copious rains fall soon hardly any crops will be reaped. Pasturage presents a very withered appearance and in some portions of the district is completely dried up. Two cases of lung-sickness were reported during the month. The usual steps have been taken to isolate the infected herds. Both large and small stock are in fairly good condition.

Elliotdale.

W. T. HARGREAVES, R.M., 7th Feb., 1902.—No rain has fallen during the month and in consequence the crops have been considerably scorched. Unless rain falls at an early date they will be destroyed and very little reaped. Millions of locusts have been hatched but are being dealt with by means of fungus. The result of the infection of the swarms has not yet been reported, but I hope for success as it has not failed to kill them in former years. The forage crops reaped were splendid and forage is plentiful, though selling at about 20s. per hundred bundles. In spite of the drought pasturage is good and stock of all descriptions are in good condition.

Flagstaff.

J. F. C. REIN, R.M., 31st Jan., 1902.—Although the weather during the past month was more favourable than that during December yet the damage caused to crops by excessive rainfall during December, mentioned in my report for that month, has not been removed, and harvest will be affected to a considerable extent. Stock of all descriptions are in good condition, pasturage being excellent and plentiful. No diseases have been reported.

Kentani.

N. O. THOMPSON, R.M., Jan. 27, 1902.—Crops have suffered much from worm and locusts, while those more recently planted are suffering from want of rain. Stock are in good condition, the only disease reported during month being 4 cases black gall-sickness. Pasturage is still good. 7th Feb., 1902.—The past month has been very dry and crops have suffered much in consequence. Fortunately within the last week we have had several refreshing showers, otherwise I fear the crops would have been almost ruined. As it is the good harvest anticipated in the early part of the season is not likely to be realized. Even supposing the weather remains favourable for the next two months the yield, will, at best, be not more than fair. If the weather proves unfavourable the crops will be bad, as all the early mealies were destroyed by worm, and those now coming on are still small. Pasturage is good and stock looking as well as can be expected during the tick season. Prices of stock continue very high, Kaffir cows fetching as much as £18 and small calves £8 and £10 apiece.

Libode.

J. Colburn Garner, R.M., 1st Feb., 1902.—There is at present every prospect of a very early harvest, and provided the district receives no locust visitation, I anticipate a very abundant yield amongst the cereal crops. The rainy season has just terminated, and the district has, up to the present, received a very copious and constant supply. Stock are in good condition at present, although there have been a few instances of horse-sickness, which resulted in the death of two horses. There has been a very bountiful supply of veld throughout the season.

Lusikisiki.

R. W. Stanford, R.M., 31st Jan., 1902.—During the early part of the month rain fell in abundance, followed by a succession of dry sultry days. Horses and stock generally are free from contagious diseases of a virulent nature. The young crops of mealies are coming on well, and in many parts a fair crop will be realized. The ravages of a species of maggot and the effects of too much water will tend to diminish the harvest.

Maclear.

J. Simpson, A.R.M., 4th Feb., 1902.—There is very little to report for January. The month has been very dry, and rain is much needed in some parts of the district for mealie and other crops. On the other hand it has been suitable weather for harvesting, and all late forage crops have been got in dry. I have heard of no diseases of any consequence in stock.

Matatiele.

R. F. Comming, A.R.M., 26th Feb., 1902.—During the past month no rain fell, consequently the growing crops have suffered much. Pasturage in certain parts of the district has also been burnt up by the excessive heat. Stock of all kinds continue in good condition.

R. L. Harries, A.R.M., 31st Jan., 1902.—Rain is greatly needed. The crops do not look so promising as they did a month ago. The fruit season is poor. Pasturage is still good and stock continue in good condition. Redwater has made its appearance in the district and lung-sickness still exists in quarantined areas.

Mount Currie.

A. Rein, A.R.M., 31st Jan., 1902.—I have nothing to add to my report for the past month. All crops look well; oat-hay has been reaped in large quantities and is of good quality. The only prevailing disease in cattle is lung-sickness, but it does not appear to be on the increase. In a short time it is hoped the district will again be free of it.

Mount Fletcher.

J. C. Hargreaves, R.M., 1st Feb., 1902.—The weather during the month has been very dry, scarcely any rain falling. Many lands have been scorched, and I fear the yield will not be as good as was anticipated at the beginning of the season. Lung-sickness still appears here and there. All areas have been quarantined. Stock are in good condition. The veld in places is very dry and shrivelled.

Mount Frere.

H. H. Bunn, R.M., 26th Feb., 1902.—Splendid rains fell during the month of January, and there is every prospect of a good harvest. Pasturage is plentiful, and stock, both large and small, are in good condition.

Ngqeleni.

J. W. Morris, R.M., 30th Jan., 1902.—During the month of December there was an abundant downfall of rain, and crops are progressing favourably. With the exception of a few isolated cases of horse-sickness, stock of all kinds are in a healthy condition.

Nqamakwe.

C. J. Warner, R.M., 29th Jan., 1902.—Good rains fell during the early part of December, and ploughing was continued by the Natives until nearly the end of the year. Stock are in good condition. No locusts appeared. 3rd Feb., 1902.—The weather during the past month ranged from extreme heat to wintry cold. No rain fell, with the exception of slight local thunder showers. The Native [illegible] the track of these showers are flourishing, but in localities not so favoured the crops are parched and withered beyond recovery. The same may be said of the veld. Stock of all kinds are in fairly good health. No locusts visited the district.

Port St. John's.

W. J. St. J. Turner, R.M., 27th Jan., 1902.—During December the natives have been busy trying to clear their lands, a necessary but very difficult piece of work just now owing to the heavy rains that have fallen in the district. In the lowlands this has already done considerable damage to the mealie crops. In the higher parts of the district the gardens are looking very well and tobacco promises to be both plentiful and of good quality. Stock of all kinds are healthy and in good condition. 1st Feb., 1902.—Damp weather has been very persistent during the past month, and this had the effect of causing the grub to appear in many of the mealie lands, which otherwise are looking very well. Potatoes have also suffered considerably through rust in the low-lying lands. Tobacco promises to give a large crop and prices are already falling. Stock of all kinds continue healthy and in good condition.

Qumbu.

E. Russell, Acting R.M., 31st Jan., 1902.—The weather during the past month has, on the whole, been dry, and rain is very much needed. Lung-sickness amongst cattle still continues to be reported, but, as stated in previous reports, it appears, with one or two exceptions, only amongst cattle recently introduced into this district.

St. Mark's.

A. Gladwin, R.M., Dec., 1901.—Pasturage is good, all kinds of stock in excellent condition. Lung-sickness, however, continues throughout the district. Growing crops of mealies and Kaffir corn promise a very good harvest. Record crops of forage have been reaped, but wheat, owing to rust, has failed. Jan., 1902.—Owing to no rain having fallen during the past month pasturage has been parched and the growing mealies and Kaffir corn scorched and in parts quite burnt up. Stock continue in good condition, but regret to report fresh cases of lung-sickness and an outbreak of redwater at Southeyville, this latter of a very virulent form. A few flying locusts are in the district. I got up a few bags of Texas and River Plate rust-resisting oats from the Agricultural Department last winter. These were put in in July and August and reaped in December by the people amongst whom I distributed same. They took the rust in some cases but in all the forage had very heavy heads.

Tabankulu.

R. H. Wilson, Acting R.M., 31st Jan., 1902.—Nice rains fell during the earlier part of the month, but latterly it has been rather dry and consequently the crops in the valleys are beginning to suffer. It is hoped that the season will continue as it commenced, in which case the cereal crop this year will be a record one. I regret that lung-sickness is still spreading in the neighbourhood of the first outbreaks, in spite of all endeavours made to prevent it. The natives cannot be induced to see the folly of buying stock from outside; however, this ought to be a lesson to them. Pasturage is excellent, and consequently all stock are looking well.

Tsolo.

W. M. Carlisle, A.R.M., 24th Feb., 1902.—There is nothing unusual to report for the past month. Little rain has fallen, crops are very good. Stock of all kinds in good condition and the pasturage very good.

Tsomo.

W. J. G. Thompson, R.M., 4th Feb., 1902.—The rainfall registered during the month was 2½ inches. Two cases of lung-sickness and one of redwater were reported during the month; in each case the locality was placed under quarantine. I regret to state that the crops, which looked so promising, have, in many parts of the district, been scorched up by the dry winds and hot sun, and unless we have very good rains this month the harvest will not be so good as it was last year. Horses, cattle and small stock, are, on the whole, in good condition.

Umtata.

A. H. Stanford, R.M., 6th Feb., 1902.—The month of January has been exceptionally dry and in consequence the crops have suffered very greatly. Lung-sickness is still existing in the district, areas in various localities being placed in quarantine.

Umzimkulu.

Captain E. J. Whindus, R.M., 1st Feb., 1902.—Thunderstorms were frequent during the first half of January, and during the latter half light drizzling rains, but more good soaking rains are still required. Pasturage is all that can be desired, and stock are looking well. Cases of biliary fever among horses have been rather frequent. Prospects of a good harvest of cereals continue bright, and the Natives' food supply promises to be abundant this year.

Willowvale.

M. W. Liefeldt, R.M., 31st Jan., 1902.—Lung-sickness has made its appearance at the kraal of a native in Dweba's Location in this District, but with this exception the District is entirely free from contagious diseases.

Xalanga.

E. H. Hogge, R.M., 3rd Feb., 1902.—The past month, like the previous two, has been very dry, and pasturage as well as crops have suffered accordingly; in fact, whether there will be any mealies depends now entirely on the rainfall of this month (February). The oat crops are good, but wheat is thrashing out very [illegible] Stock are still looking well.

AGRICULTURE.

Report on Irrigation in South Africa.

BY MR. W. WILLCOCKS, C.M.G., M.I.C.E.

(*Continued from page* 294.)

The flood irrigation performed by the canals on the farm is a rough kind of basin irrigation which has changed a considerable portion of ordinary Karoo soil into good grass land; indeed, much of the basin irrigation of Egypt in its infancy may have been like this. As the silt-laden flood waters deposit their silt without any control by the banks or banked canals, there is a very heavy deposit of almost pure sand near the canal heads and a tendency for the waters as they course over the plains to score out natural channels. To remedy these patent evils and utilise the water to the utmost, it will be necessary for Mr. Southey to construct dykes, canals and regulators. He is fully alive to this necessity, and remedies it in a way by carefully watching the floods and turning the waters now down one channel and now down another. An exact survey of the property, with levels and contours, would enable an engineer with experience of basin irrigation to design works which would very probably enable Mr. Southey to convert a good part of the flooded land into arable land and considerably add to the value of his pastures. The farm, as it stands, is a monument of skill and courageous enterprise, but an irrigation engineer, with experience of basin irrigation as practised in Egypt, should be able to double and treble the value of the estate at a moderate expenditure.

I know from what I have seen, and from the general fall of the country, that fairly level farms, such as Mr. Southey's, cannot be very common in the Eastern Province, but there are many estates which could be doubled in value by the available flood waters of the rivers being utilised. At Queenstown we had about three-quarters of an inch of rain the day I was there, and the discharge of the stream passing through the town rose from three cubic inches per minute to four cubic feet per second. As the stream has numerous dolerite dykes across it of great strength, it would have been an easy matter to lead a small watercourse or canal from the up-stream of one of the dykes to the extensive flats on the left of the stream, and so utilise the flood waters by giving the barley and the wheat crops a heavy irrigation which would have been very beneficial to them. Such places must be very numerous in the Eastern Province, and a moderate expenditure would add greatly to the value of the properties so situated. The town of Queenstown is desirous of closing a narrow gap in the Bongola River, about three miles from the town, and forming a reservoir with the aid of a dam some sixty feet high. A masonry dam could be constructed here which would add considerably to the water supply of the town. The valley, up-stream of the proposed dam, has gentle slopes and there is not much scouring out of soil. All places where such scour is going on should be protected, and the cost of such prevention of scour should be considered a part of the expense of the reservoir dam. The Queenstown water supply comes from the Bongola River and consists in the dry season of thirty cubic feet per minute for four days out of seven, the remaining three days the supply is utilised by the farmers outside the town. The water meant for the town is stored in a reservoir on the side of the hill, which is formed by a dam some 2,000 feet long and fifteen feet wide at top. The inner slope is three to one and the outer two to one. At its deepest part the dam is 35 feet high and holds up 90 feet water. The water covers some 14 acres of ground. In the town the gardens are irrigated at a rate of £4 10s. per acre per annum. The rate is not considered excessive, and I was informed in the town that irrigation by a Persian wheel from a well 20 feet deep was more expensive. Mr. Joplin, M.D.C., of Queenstown, supplied me with much information about subsoil water, and is very eager to see the reservoir constructed on the Bongola River.

At Cathcart it struck me that much might be done for the town by constructing watercourses and utilising the flood water when the river was in flood. Indeed, wherever I went I was struck by the fact that the farmers might always insure a plentiful irrigation of their crops with flood water every time it rained, and so increase the yield of their crops.

From Cathcart southwards to Kingwilliamstown the rainfall becomes more plentiful and constant, and the grass-covered hills look capable of supporting far more stock than what they did at Queenstown. The holdings here are about 2,000 acres each in extent, and each acre is considered capable of supporting two sheep with a general value of £3 per acre for good land. Indian corn and pumpkins for stock are sown from near Queenstown southwards without irrigation and yield good crops. About 3 per cent. of the areas of the farms might be considered as under cultivation. The pastures were improving by being eaten down and only partially burnt, but one could see everywhere that the absence of the fires had resulted in a great increase of the incango weed, which was in some farms extending greatly and ruining the grass. This weed should never have been allowed to make the headway it has. The commonage of the Kaffir Location in the Peelton Mission Station was being ruined by incango. The German farms near Kingwilliamstown grow crops of all kinds without irrigation. The farms looked more untidy than what I had expected. I was informed that the sons of the original farmers were not agriculturists of the type of their fathers. The men, as a rule, preferred work elsewhere to farming.

I was informed by Mr. Lister, Conservator of Forests, that streams such as the Kat, the Kabousie, the Keiskama, the Klipplaats and others near the sea, had a perennial discharge with a minimum of about 100 cubic feet per second. These rivers had, moreover, good dykes for constructing weirs on gently-sloping valleys. This water was scarcely utilised. The value of this water near the sea will never be appreciated until the idea is abandoned that cereals are the only crops worth growing, and that manures are not necessary. The attempt to grow cereals year after year without manure and without rotation of crops has made the wheat crops so liable to rust that agriculture is discounted everywhere near the sea. Wherever perennial water of any kind can be obtained in the important stock districts of the Eastern Province, lucerne, at least, might be planted to the utmost limits of the water. The Government of the Cape Colony has done little to instruct agriculturists by example on its own properties.

Locusts were complained of everywhere. Their visitation had been recent and was probably due to the terrible drought of 1895-96, which drove the locusts out of their ordinary haunts into the Eastern Province. Spraying the young locusts with washing soap and water was considered the most effective way of destroying them. During years of ordinary rainfall in Bechuanaland and the Karoo this Province remains free of locusts.

THE DISTRICTS OF ALIWAL NORTH AND HERSCHEL.

As one leaves the high plateaux of Molteno and Stormberg on the way to Burghersdorp, one leaves the areas of more or less timely and fair rainfall and enters the Karoo a second time. The grasses are left behind and pure Karoo bush is encountered. The observations on the North-Eastern Karoo apply directly to the Colesberg and Burghersdorp Districts, which lie between 4,000 and 5,000 feet above sea level, and have a mean rainfall of some fifteen inches per annum. At Aliwal North begins a region of better rainfall, and the Karoo bushes are replaced by veld grasses. The Kraai River near Aliwal North has a very fair discharge which cannot be profitably utilised, as there is little hard rock in the neighbourhood, and the river has cut a channel over 50 feet deep through deep undulations of rock and soil, where canals would be constructed with great difficulty. Though I only saw parts of the other rivers in this districts, I should say that the same remarks applied to all of them.

The town of Aliwal North is supplied with water for drinking and irrigation purposes by a warm spring discharging about one cubic foot per second. There is a considerable area under gardens and timber, but the water is not used as economically as in the Karoo.

The Aliwal North, Herschel and New England districts lie between 4,500 and 6,000 feet above sea-level and have a rainfall of some 30 inches per annum. They are sufficiently close to the Drakensberg to get rain in August and September, as well as in January, February and March. A good Indian corn crop can be counted on every year, and wheat in five years out of six. About one-third of the cultivable area seems to be put under cultivation. There is a total absence of salt and lime in the soil. The grasses, however, are good, and it is considered that one acre can support one sheep. Some progressive farmers have been very successful in raising turnips and swedes for winter feeding for their stock, but generally the agriculture seems backward and rotations of crops and manuring unknown. Great denudation of the country is going on, but I shall devote considerable attention to this subject when writing about Basutoland, and shall say nothing further here. The veld is being overrun in many places by the yellow tulip.

WELL SINKING IN THE CAPE COLONY.

The extraordinary success which has attended deep bores in South-Western Queensland has not been obtained in Cape Colony, nor ought it to be expected. In South-West Queensland, the rains which fell to the west of the dividing range along many hundred of miles are absorbed by the ground and never reach the sea, and must have laid up rich stores of water which are available for use to-day. In South Africa the rain water everywhere escapes to the sea and the subsoil water can only be very local and insignificant in quantity. Shallow wells and windmills have, however, been a great success over large stretches of country and have helped to save hundreds of thousands of sheep in years of drought. Since 1890 the Cape Colony Government has been boring holes for water with the aid of a special staff and implements. The general results up to the end of 1898 are, approximately, as follows:—

Number of holes bored—2,600.
Successful—about five-sixths.
Unsuccessful—about one-sixth.
Cost of boring—per hole, £17.
Average depth of hole—60 feet.
Total discharge of water—26 cubic feet per second.
Discharge per hole—¾ cubic feet per minute.
Practically all the holes need machinery of some kind to lift the water.

This quantity of water is insignificant for irrigation, but for watering stock it is of the utmost value to the Colony.

BASUTOLAND.

Basutoland lies generally between 5,000 and 7,000 feet above sea-level. It has a better rainfall than any part of South Africa, except Natal and the south-western corner of Cape Colony. The rainfall is heaviest in the Drakensberg and lightest in the flat plateau between Maseru and Mafeteng. In the former it may be considered as having a mean annual fall of 35 inches per annum, and in the latter of 28.

In a year of drought the latter may fall to 18 inches, and the former to 25. The rainfall, though badly distributed, as it is nearly everywhere in South Africa, is nearly always sufficient to allow of wheat being sown between July and August and reaped in December without irrigation. Indian corn and millets are sown between September 15th and November 15th, and reaped in April. Generally speaking, one-third of the cultivated land is sown with wheat, one-third with Indian corn, and the remaining third with millets. No rotations of cereals with leguminous crops are practised, and no manure is used. Cultivation has been going on for some thirty years, and the soil is by no means as productive as it was at the beginning. If there is rain in August and September a good harvest is assured. The failure of the rain in August, September and October, as in 1895-96, inflicts heavy losses on the people. This failure of the rains is more pronounced in the south-western portion of Basutoland than in the lands near the Drakensberg. If suitable manures were employed and careful cultivation gone in for, this country with its friable soil should be eminently suitable for all root crops, like potatoes, onions and turnips. Mr. Brabant, who practices gardening on true scientific principles at Maseru, considers the country very well suited for all root crops. It struck me that beetroot would answer admirably in the valley of the Caledon River up-stream of Ladybrand, and in the main tributaries of the Caledon.

The greater part of the country is given up to pasturage, and there are numerous herds of cattle and ponies and flocks of sheep and goats. It is considered that one acre of grass land is capable of supporting one sheep. The country is extraordinarily treeless, and the rocks are everywhere a weak sandstone, with transverse thin dykes of very thin dolerite. Nowhere do the rocks appear to have any consistency, with the natural consequence that the Orange, Caledon and Cornet Rivers run in low sandy troughs, with comparatively gentle slopes.

The absence of trees on the hills in spite of the heavy rainfall may be attributed to the sandstone, which in South Africa generally (except near the Coast) seems incapable of producing indigenous trees. Wherever the dolerite is met with in any quantity these trees and shrubs are encountered, but this latter rock is very rare in Basutoland, except in thin degraded dykes. These dolerite dykes are, however, impervious to water, and could be utilised everywhere for dams of forty feet in height and under. Trees planted along these dykes seem to answer better than elsewhere.

The depth of soil is nowhere very great, and varies in depth from about two or three feet to twenty or thirty feet in a few places. The general depth of soil may be taken as five feet. The soil is a sandy loam, singularly free from salt and lime. As, moreover, the soil is very friable and the slopes severe, because the rivers have cut deep channels through the hills, the least collection of water by the numerous roads, paths and cattle tracks scours away the ground, and cuts the country up into ravines. The denudation of the country, owing to these ravines, is very serious; and if allowed to continue for as many years in the future as it has during the last thirty years, the loss to the country will be incalculable. This scouring action of the water is aggravated very considerably in Basutoland by the Basutos building their villages on the tops of the hills, and the women in carrying up water from the springs, wearing out deep tracks in the hill sides, which become streams of water during rain, and add further to the denudation of the country. Seeing in Basutoland the effect of about thirty years of cultivation and more or less intense habitation, convinced me of the fact that another country with steep slopes and thin depth of soil like Palestine has been almost completely denuded by hundreds of years of cultivation and intense habitation. The Palestine which Joshua conquered, and which the children of Israel inhabited, was in all probability covered over great part of its area by sufficient earth to provide food for a population a hundred times as dense as that which can be supported to-day. The denudation of centuries has swept its steep hill sides clear of deposit, and the bare hills to-day are capable of doing little in the way of supporting life. Large parts of Greece may have suffered the same denudation. A corresponding fate undoubtedly awaits Basutoland unless immediate steps are taken to arrest the denudation which is everywhere apparent.

A beginning should be made with the ravines, which are degrading fastest by throwing athwart the streams bars of brushwood and stone enveloped in galvanized iron netting. These stone and brushwood bars should be about three feet high in the middle and four feet high at the sides, and have their flanks buried in the earth and protected by stone. After the first fall of rain, in the deposit collected by the bars should be planted willow and poplar cuttings in the damp ravines, and wattles and aloes in the dry ravines. The same cuttings should be put in liberally lengthwise along the sides. The head of every ravine should be protected by a stepped stone barrier, as is so successfully done at many road crossings. The stone barriers should also be enveloped in wire netting. For the first three years the plants and cuttings will need protection from goats, and this can be afforded by wire fencing, which will be removed from place to place as the years roll on. I have seen two very successful examples of the value of poplars and willows in stopping denudation, one near the Assistant Commissioner's Residency at Mohalieshoek, and the other on a smaller scale at Ficksburg. It may seem an expensive remedy, but in the end it will be self-supporting. The young trees will be capable of being pollarded and provide fuel, which is both scarce and very badly needed in the country. Indeed, if all the ravines were filled with trees, it might even result in increased rainfall in the critical months of August, September and October.

With respect to irrigation, I may state that nothing can be done without reservoirs, and I have nowhere seen in Basutoland any rock capable of supporting a greater head of water than 40 feet. The use of flood water has little to commend it anywhere except in the

Caledon River Valley, which will be considered under the heading of "The Conquered Territory of the Orange River Colony." The rainfall is generally sufficient to secure good harvests. The presence of perennial irrigation allows of vegetables being produced throughout the year and of double cropping on rich, well-manured lands. It would also allow of lucerne in the valleys, which would be of great value for feeding stock. Reservoirs would, however, pay nowhere except near the important centres.

What Basutoland wants is better cultivation with the introduction of leguminous crops and roots, in rotation with cereals. Suitable manures and crops would do much more for the country than irrigation, and would do it at one-tenth the cost. The way to proceed would be, I think, to have small model farms at all the Residencies, where practical experiments might be carried on to prove which were the most suitable legumins and roots for the country, and which were the best manures. If *obviously* satisfactory results were obtained, a people so intelligent at the Basutos would certainly imitate them. An effort should also be made to encourage a taste for pulses among the people. It may seem a homely thing to educate people to eat one class of food rather than another, but the future agricultural development of the country depends on it. As the Chief Commissioner of Basutoland and all the Commissioners are ardent agriculturists and take great interest in forestry, the experimental farms attached to the Residencies would begin life under happy auspices. The comparative value of perennially irrigated land, the land depending entirely on rainfall, might be also studied to great advantage.

The dangerous weed peculiar to the country is the yellow tulip, which is increasing alarmingly in certain districts. I think that these noxious weeds, peculiar to certain districts, are encouraged in their growth by the lying fallow of large tracts of land every year. During the fallows, the veld grasses are absent, and the weeds have it all their own way. These weeds not only increase much in the fields, but their seeds are carried into the neighbouring grass tracts, and so spread everywhere. I have been informed, however, by some agriculturists, that the increase of these weeds is due to the burning of the grass in the wrong season. If the grass is burned in September and October the noxious weeds increase with difficulty, but if the burning is delayed to January and February the weeds make headway.

THE CONQUERED TERRITORY OF THE ORANGE RIVER COLONY.

The Conquered Territory consists of that part of the Harrismith, Ficksburg, Ladybrand and Wepener Districts which borders the Caledon River, and which, generally speaking, drains into the Caledon River. The country lies between 4,500 and 5,500 feet above sea-level, and has a rainfall varying from 25 inches near Wepener to 30 inches at Ficksburg and Harrismith. In this territory, as in Basutoland, the rainfall is generally sufficient in

August, September and October to allow of wheat being sown between June and August and reaped in December without irrigation. The agricultural value of the land improves as one approaches the Drakensberg, as the rains are more constant. The veld is covered with good grass, and agriculture is steadily on the increase. This tract is universally considered the best suited of any in South Africa for European settlers. The springs are numerous. In the Karoo no springs are met with in the hills, while those in the valleys have a general discharge of four cubic feet per minute. Here the springs in the hills run to four cubic feet per minute, and those in the valleys to 40 cubic feet per minute. Such springs are collected in reservoirs and are capable of working small corn mills.

Analyses of Soils; Paarl and Worcester Divisions.

In continuation of the series of analyses of Colonial soils which have from time to time been reported in the pages of this *Journal*, Mr. Sinclair, of the Government Analytical Laboratory staff, has visited the districts of Paarl and Worcester for the collection of samples. The samples collected are described in the following account of his trip:—

Starting in the PAARL DIVISION, seven samples were collected in the Field Cornetcy French Hoek.

The soil of this region falls into two classes, first the "graauw grond" of the hill side, a yellow soil consisting of clay with quartz pebbles and stone, and secondly a black alluvial soil from the lowest parts of the valley. It was expected that the composition of the soils would be found to vary fairly considerably owing to the diverse nature of the rocks occurring in this district; generally however the soil may be regarded as the product of rocks, of the Malmesbury series, Table Mountain sandstone, and granite.

Samples Nos. 1 and 7 are hillside soils. Nos. 2, 3, 4, 5 and 8 are alluvial soils from the valley. Sample No. 1 comes from Mr. G. Kriel's farm adjoining "Keerweder." It is gravelly in composition. Sample No. 2 is a black alluvial soil taken from the same farm. The land represented by the sample is planted with vines. No. 3, a similar soil, is from the farm "La Dauphine" of Mr. T. F. Malherbe. Sample No. 4 was taken on the farm "Cabriere" of Mr. A. C. Siebrits. It is similar in character to Nos. 2 and 8. No. 5 is a rich black soil overlying potclay on the farm "La Terre de Luque" of Mr. D. H. Joubert. No. 6 represents a mixture of surface and subsoil, such as is obtained when the ground is put under cultivation, on "La Terre de Luque" of Mr. P. A. Ekstеen. The subsoil is a yellow gravel containing much clay and pebbles. Below the depth to which the sample was taken potclay is found. The surface soil is a clay.

This soil appears to have a good water capacity, and the vegetation on it is reported to withstand the effects of drought to a greater extent than is the case with the "graauw grond"—the ordinary hillside soil. Of this "graauw grond" No. 1 as already stated may be taken as representative.

Sample No. 7 is a black soil lying close to the river on Mr. W. Schalkwyk's farm "Zanddrift" and may be regarded as typical of the lands along the river.

The remarks made in connection with the origin of the soil in French Hoek Field Cornetcy apply also largely to the Groot Drakenstein Field Cornetcy.

Sample No. 8 is a black valley soil from Mr. Holloway's farm "Le Plaisir Merle." The soils along the Dwars River are represented by Sample No. 9 from the farm "Bossen Dal." No. 10 is a hillside soil from Mr. A. Louw's farm "Babylon's Toren."

In the Field Cornetcy of Achter de Paarl five samples were taken, No. 11 from "Matjes Kuil" of Mr. P. Briers, No 12 from "Groenfontein," owned by Mr. J. Briers. Nos. 13 and 14 from "Kuilenberg," the farm of Mr. A. de Waal, and No. 15 from Mr. Basson's farm "Brandenburg." No. 11 is a sandy soil containing a little clay. It overlies a gravel. When manured with stable and kraal manure, wheat, rye and oats appear to thrive well. On going west towards Klapmuts the soil becomes more and more sandy. Samples Nos. 13 and 14 furnish examples respectively of the "hillock" and low lying soils referred to in former reports. The occurrence of these little hillocks—"heuveltjes" as they are locally termed—has been remarked in other parts of the South-Western provinces. The soil of these hillocks has usually been found to be richer than the soil round about (See *Agricultural Journal*, Vol. xiii, page 818). Whilst the rhenoster bosch, a bush more or less typical of rather poor soils of the Cape Peninsula, is found all *around* these hillocks, *on* the hillocks themselves we find the distel doorn, which seeks the richer soil. No. 15 from "Brandenburg" represents the soil north of the previous sample. When properly treated it appears, from accounts, to yield very satisfactory results. Lamziekte is unknown on the farm and on the pasturage goats thrive well. This would seem to be evidence of the presence of a fair proportion of lime and phosphates in the soil. The geological formation of this district is that of the Malmesbury beds.

In the area represented by the Paardeberg Field Cornetcy the formation is the same as that just mentioned. Three samples were taken as typical of the soils of this portion of the Paarl division. Sample No. 16 was collected at "Lange Rug," the farm of Mrs. J. A. Cilliers. Nos. 17 and 18 represent the hillock and lower soil respectively at "Knolle Vallei," the property of Mr. Eksteen. It may here be added that barley growing in these hillocks withstands the attacks of rust to a much greater extent than the barley growing on the surrounding soil. No. 18 is somewhat more sandy and appears generally poorer than No. 17.

In the Field Cornetcy North Paarl, sample No. 19, taken on the farm "Vrede Hof" of Mr. G. R. Retief, represents the soil at the foot of the Paarl Mountain. Here the intrusive granite which constitutes the Paarl Mountain will, if sufficiently disintegrated, bring about a change in the composition of the soil.

Going Northwards from Wellington we have sample No. 20 from the farm "Driefontein" of Mr. Russouw, in the Wagenmakers Vallei Field Cornetcy. This soil, which is described as a cool soil, overlies a clay subsoil. On it vines do well and do not appear to languish as is the case when grown on black "turf" (alluvial) soil. The soil of Burgers Drift was sampled in No. 21, taken from a portion of the farm occupied by Mr. Malan. In dry seasons, I am informed, the plants on this soil are parched.

Sample No. 22 was taken from Mr. J. Cillie's farm "Dryvers Vallei" and represents his cornlands. The next sample, No. 23, is a sample of what is locally known as "klippertjes grond," taken on the farm "Lang Hoogte." This sample represents the poorest lands on the farm. The oats grown in the districts dealt with had suffered severely from rust. Wheat had not yet been appreciably affected, though signs were not wanting to show that the disease had made its appearance. Barley had not been affected.

In the WORCESTER Division the soil is mainly the product of decomposition of the various rocks of the Bokkeveld and Ecca groups, though the Malmesbury beds are not unrepresented. Its chemical composition may hence be expected to differ considerably from that of the soils of the previous district and to show a higher average percentage of the more necessary plant foods.

Four samples were taken to represent the Worcester Field Cornetcy, Nos. 41, 42, 43 and 44. No. 41 was taken from the farm "Hartebeest Rivier," of Mr. C. W. du Toit. It is a clayey soil about 2 feet deep. Here both vines and oats are reported to do well.

No. 42 is from "Tweefontein," the farm of Mr. J. de Vos de Wet. It was collected from one of the river terraces east of Worcester. The soil appears to have been derived mainly from the sandstone of the Ecca formation. With grain it is stated to give good results, though here, as elsewhere, rust had damaged the oat crop considerably. As a rule, however, crops standing on this soil do not suffer from rust, a fact suggestive of a change of soil from that of the Malmesbury beds to the richer soil yielded on an average by the Bokkeveld and Ecca beds. No. 43 is a stiff red "Karroo" soil from "Zeekoe Gat," the property of Mr. C. Heatlie. It is regarded as suitable for vines. No. 44, on the other hand, taken from the opposite extreme of the Field Cornetcy, at "Wyzers Drift," of Mr. G. Jacobs, is a sandy, alluvial soil. It also answers fairly well when planted with vines.

The soils of the Field Cornetcy Over Hex River are represented in samples Nos. 36, 37, 38, 39 and 40. Sample No. 36 was taken on the farm "Nonna," of Mr. C. P. Kloppers. It is a black, alluvial soil, somewhat sandy, typical of much of the soil found along the Nonnas River. The subsoil is a yellow, rather sandy soil; where deep it answers well for fruit; grain also appears to thrive on it.

In No. 37 Mr. A. Naude's farm "Boven Kloppers Bosch" was sampled. It is a rich soil—too rich perhaps for oats—I was informed. Vines and fruit trees, as well as barley, however, appear to do well on it.

No. 38 is a sample of rich dark "vlei" soil used for vineyard on the farm "Wilge Rivier" of Mr. S. Rabie. This soil also is apparently rather rich for oats.

No. 39 was taken at "Nooitgedacht," the farm of Mr. A. du Toit, sen. A brownish alluvial soil somewhat sandy, it represents the third variety of soil found in these parts; the first variety being the Karroo soil, the second the dark vlei ground. On it oats, corn, vines and potatoes, especially the latter, are stated to thrive very well.

No. 40 is a brown soil, more clayey than No. 39, from Mr. H. du Toit's farm "Aan de Doorns." It is rather brackish and becomes stiffer as the depth increases. At about 2 feet, I am told, lime is found overlying a sandy soil. When manured with guano the soil represented by the sample gives good results as a vineyard. The veld is sweet. From this sample an idea is obtained of the soils lying between the Nuy, Hex and Nonna Rivers.

The next part of the country visited was the Field Cornetcy Voorste Boschjesveld. Here samples Nos. 31, 32, 33, 34 and 35 were collected In No. 31 is represented the soil of medium quality found on Mr. F. G. du Plessis' farm "De Doorns." This soil overlies clay. Planted as a vineyard it is stated to yield good results.

The farm "Stettin," occupied by Mr. Hooper, contributes sample No. 32. The land from which this sample was taken gave very discouraging results when put under lucerne. It is a somewhat clayey soil overlying a white sandstone. This sample was expected to compare unfavourably with many of the previous samples. The soil on the opposite side of the road (*i.e.* North-East of the spot whence this sample was taken), which appears to be more the product of Bokkeveld slates, would, I think, be found more suitable for lucerne.

No. 33 was collected on the farm "De Hoek" of Mr. P. B. de Wet. It is described as a Karroo soil, overlying a clay.

No. 34 is a sandy soil from Mr. A. de Wet's farm "Wagenboom." This soil is, I am informed, rather fertile; the land represented was about to be used for vineyard purposes.

Sample No. 35 was taken at "Matjes Kloof," the property of Mr. P. D. de Wet. It is a Karroo soil used for wheat. The veld is sweet.

In the Field Cornetcy Wagenboom Rivier samples Nos. 24, 25, 26 and 27 were collected. No. 24 is a very fertile alluvial soil of good depth taken on Mr. P. P. du Toit's farm "Eendracht." Both vines and grain answer well on it.

Samples Nos. 25 and 26 come from "Wilge Rivier" of Mr. P. Hugo. No. 25 represents the surface soil about one foot deep and

No. 26 the underlying subsoil—a stiff yellow clay. This farm is famous for its wine. The vines stand drought well and are planted so as to get their roots into the clay just referred to.

On the farm "Breede Rivier," of Mr. S. F. du Toit, is found the soil represented by sample No. 27, a dark clayey soil overlying a yellow clay. It was Mr. Du Toit's intention to utilise it as a vineyard. I was informed that it stands grain well.

In the Field Cornetcy Goudini samples Nos. 28, 29 and 30 were collected. No. 28 was collected on the farm "In de Slanghoek aan de Breede River" of Mr. D. G. Russouw. It is a dark clayey soil used for vines. It overlies a red clay. Sample No. 29 is a dark, somewhat sandy soil (alluvial) overlying a pot clay subsoil representative of the vineyard at "Groot Eiland" the farm of Mr. A. Deetlef.

No. 30 comes from the farm "Klippe Drift" of Mr. D. E. du Toit. The subsoil, which is brought to the surface in tilling, is a clay."

The above samples of soil have been analysed by Mr. A. J. J. B. Simons, B.A., of this Department, with the following results:—

TABLE I.

Name of Farm and No. of Sample.	Perc'tage of Original Soil	Percentages in Soil Sifted through 1 m.m. Sieve.				Percentages in Soil Sifted through ½ m.m Sieve.		
	Fine Earth below ½ m.m.	Water.	Organic Matter.	Chlorine.	Nitrogen.	Lime.	Potash.	Phosphoric Oxide.
PAARL DIVISION.								
Field Cornetcy French Hock.								
1 Keerweder	77·9	2·156	7·574	·0092	·146	·010	·039	·042
2 ,, ...	70·4	1 464	4·268	·0102	·116	·042	·087	·042
3 La Dauphine	57·8	·812	2·546	·0081	·088	·008	·013	·038
4 Cabriere	84·5	1·886	4·802	·0265	·116	·016	·124	·037
5 La Terre de Luque ..	65·1	·966	2·776	·0067	·081	·008	·013	·022
6 ,, ,, ,, ,, ..	56·9	1 562	4·770	·0106	·088	·006	·015	·017
7 Zand Drift	86·3	1·412	3·854	·0127	·116	·058	·019	·038
Field Cornetcy Groot Drakenstein.								
8 Le Plaisir Merle ..	68·4	·992	3·454	·0035	·116	·020	·021	·073
9 Bossen Dal	95·1	3·786	9·960	·0184	·174	·008	·033	·098
10 Babylon's Toren ..	59·8	·312	1·170	·0092	·029	·040	·014	·020
Field Cornetcy Achter de Paarl.								
11 Matjes Kuil	51·0	·290	1·286	·0071	·038	·024	·010	·017
12 Groenfontein	81·2	·668	2·646	·0212	·095	·012	·029	·027
13 Kuilenberg	53 6	1.132	5·234	·0127	·116	·072	·045	·061
14 ,, ...	55·1	1·713	6·412	·0212	·160	·100	·073	·055
15 Brandenberg	81·7	1·298	6·594	·0081	·116	·014	·091	·115
Field Cornetcy Paardeberg.								
16 Lange Rug	65·3	1·114	5·224	·0109	·088	·034	·041	·046
17 Knolle Vallei	79·6	1·716	7 394	·0170	·153	·098	·044	·056
18 ,, ,, ...	68·7	·316	1·766	·0149	·052	·012	·013	·010
Field Cornetcy North Paarl.								
19 Vrede Hof	61·5	·872	3·686	·0060	·066	·034	·014	·055

Conti

	Perc'tage o Original Soi	Pe	So		ugh m.m. S		in m.	il Sifted through Sieve.
	Fine Earth below ½ m.m.	Wate	Organi Matter	Chlorin	N	Lim	Po	Phosphoric Oxide.
PAARL DIVISION.								
Field Cornetcy Wagenmakers Vallei.								
20 Driefontein	50·6	518	1·	·0216	073		·048	019
Field Cornetcy Groenberg.	60·3		4	·0216	·073	·026	·075	
21 Burger's Drift	51·8		4·		·139	·014	·039	
22 Dryver's Vallei	55·8		2·			·010	·042	
23 Lang Hoogte								
WORCESTER DIVISION.								
Field Cornetcy Wagenbooms Rivier.								
24 Eendracht			6·616		·158			
25 Wilge Rivier			7·548		·266	50	·147	
26 „ „			7 150		·071	56	·015	
27 Breede Rivier			3·768	·0074	·116			
Field Cornetcy Goudini.								
28 Slanghoek	98·5		0·472	·0163				
29 Groot Eiland	76·3		4·296	·0255	·144			
30 Klippe Drift	79 5		2 840	·0142	·071	·024	·018	
Field Cornetcy Voorste Boschjesveld.								
31 De Doorns	74·1	·6	2·482		·116			·05
32 Stettin	75·2	·9	3·378		·116	·0	·067	·047
33 De Hoek	84·1	3 8	6·		·137	·6	·157	
34 Wagenboom	33·2	·1			·036	·0	·015	
35 Matjes Kloof	70·7		1·		·071		·041	

TABLE Contin

Name of F and No. of Sa	'tage of al Soi	Pe		'ted through 1 m.m. Sieve.		es in Soil Sifted ½ m.m. Sieve.		
		Water.	Mat	ine.	Nitrog	Li	Pot	Ph horic de.
WORCESTER DIVISION.								
Field Cornetcy Over Hex River								
36 Nonna ..	75·5	1·454	3·642	·0219	·158			[illegible]
37 Boven Kloppers Bosch	79·1	1·898	5·494	·0099	·172			·081
38 Wilge Rivier ..	87·6	2·552	6·450	·0810	·217			[illegible]
39 Nooitgedacht ..	68·1	·444	1·184	[illegible]	·050		·114	
40 Aan de Doorns ..	86·6	1·076	2·536		·100		·119	
Field Cornetcy Worcester.								
41 Haartebeest Rivier	70·9	·792	3·470		·081	·016	·091	·051
42 Tweefontein ..	70·0	·782	2·978	[illegible]	·094	[illegible]	·158	·078
43 Zeekoegat ..	89·6	1·594	4·040	·019	·144		·195	089
44 Wyzers Drift ..	[illegible]	·560	1·998	·016	[illegible]		·011	·034

Referring the determinations of Lime, Potash and Phosphoric Oxide to the original soils, the following figures are obtained :—

TABLE II.

	Name of Farm and No. of Sample.	Lime.	Potash.	Phosphoric Oxide.
1	Keerwoder ..	·008	·031	·033
2	" ..	·080	·061	·030
3	La Dauphine	·005	·008	·022
4	Cabriere ..	·014	·105	·031
5	La Terre de Luque	·006	·009	·014
6	" "	·004	·009	·010
7	Zand Drift..	·050	·017	·033
8	Le Plaisir Merle	·014	·014	·050
9	Bossen Dal	·008	·032	·093
10	Babylon's Toren	·024	·009	·012
11	Matjes Kuil	·012	·005	·009
12	Groenfontein	·010	·024	·022
13	Kuilenberg ..	·039	·024	·033
14	" ..	·055	·040	·080
15	Brandenberg..	·012	·075	·094
16	Lange Rug ..	·022	·027	·030
17	Knolle Vallei	·078	·035	·045
18	" "	·008	·009	·007
19	Vrede Hof ..	·021	·009	·034
20	Driefontein ..	·011	·024	·010
21	Burgers Drift	·016	·045	·033
22	Dryvers Vallei	·007	·020	·028
23	Lang Hoogte	·006	·024	·015
24	Eendracht ..	·066	·037	·069
25	Wilge Rivier	·081	·079	·050
26	" "	·155	·015	·025
27	Breede Rivier	·072	·028	·028
28	Slanghoek ..	·022	·028	·134
29	Groot Eiland	·050	·017	·131
30	Klippe Drift.	·019	·015	·035
31	De Doorns .	·026	·063	·039
32	Stettin .	·033	·050	·035
33	De Hoek .	1·379	·132	·055
34	Wagenboom .	·013	·005	·008
35	Matjes Kloof.	·062	·029	·023
36	Nonna .	·118	·051	·048
37	Boven Kloppers Bosch	·181	·067	·065
38	Wilge Rivier..	·280	·198	·084
39	Nooitgedacht	·041	·078	·024
40	Aan de Doorns	·385	·108	·045
41	Hartebeest Rivier	·009	·074	·036
42	Tweefontein ..	·027	·111	·055
43	Zeekoegat ..	·283	·175	·080
44	Wyzers Drift	·017	·008	·024

Grouping the samples according to the Field Cornetcies whence they were taken, the following table shows the minima, maxima and average percentages of available plant food in the soils of the several Field Cornetcies of the two Divisions:—

TABLE III.

Divisions and Field Cornetcy.	No. of Samples.	Lime.			Potash.			Phosphoric Oxide.			Nitrogen.		
		Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.
I. PAARL.													
French Hoek ..	7	·006	·058	·021	·013	·124	·044	·017	042	·034	·081	·146	107
Groot Drakenstein	3	·008	·040	·023	·014	·033	·023	·020	·098	.064	·029	·174	·106
Achter de Paarl ..	5	·012	·100	·044	·010	·091	·050	·017	·115	·055	·038	·160	·105
Paardeberg and North Paarl ..	4	·012	·098	·045	·013	·044	·028	·010	.056	·042	·052	·153	·090
Groeneberg and Wagenmakers Vallei	4	·010	·026	·018	·039	·075	·051	·019	·055	·039	059	·139	·086
Summary ..	23	·006	·100	·030	·010	·124	·041	·010	·115	·044	·029	·174	·100
II. WROCESTER.													
Wagenbooms Rivier	4	·066	·156	·115	·015	·147	·057	·025	·093	·055	·071	·266	·153
Goudini ..	3	·022	·066	·037	·018	·028	·023	·044	·171	·117	·071	·203	·139
Voorste Boschjesveld	5	·038	1·640	·372	·015	·157	·073	·022	·065	044	·036	·137	·095
Over Hex River ..	5	·060	·386	·218	·068	·226	·122	·035	·096	·065	·050	·217	·139
Worcester ..	4	·016	·260	·085	·011	·195	·114	·034	·089	063	·073	.144	·098
Summary ..	21	·016	1·640	·136	·011	·226	·082	·022	·171	·065	·036	·266	·124

By way of completing the above table with respect to the soils of the Western Division I may here append the results of analyses of nine soils from the Achter Hex River Field Cornetcy, reported on a year ago. They are as follows :—

Lime.			Potash.			Phosphoric Oxide.			Nitrogen.		
Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.
·016	·442	·116	·034	·324	·120	·024	·156	·067	·014	·182	·090

If we include these nine soils in the samples from the Worcester Division we arrive at the following summary for all the *thirty* soils representative of that division :—

Lime.			Potash.			Phosphoric Oxide.			Nitrogen.		
Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.
·016	1·640	·130	·011	·324	·093	·022	·171	·066	·014	·266	·113

In the Paarl Division three soils were taken from the farm "Donkerhoek" in the Groot Drakenstein Field Cornetcy at a date subsequent to the collection of the other 23 samples. These three samples yielded the following results :—

Percentage in Original Soil.	Percentages in Soil sifted through 1 m.m. sieve.				Percentages in Soil Sifted through 1½ m.m. Sieve.		
Fine Earth below ½ m.m.	Water.	Organic Matter.	Chlorine	Nitrogen	Lime.	Potash.	Phosphoric Oxide.
70·34	2·188	6·320	·0057	·102	·096	·026	·082
80·29	2·216	6·012	·0240	·059	·048	·019	·036
36·88	·606	2·520	·0046	·088	·184	·040	·064

The determinations of Lime, Potash and Phosphoric Oxide in these three samples, if referred to the original soils, work out respectively as follows :—

Lime.	Potash.	Phosphoric Oxide.
·068	·018	·058
·039	·015	·029
·068	·015	·024

I have not included these three soils with the others from the Paarl Division, as they were taken from an orchard which had been manured, and thus are not representative in all respects of the district.

From Table II., with the addition of the soils from the Achter Hex River Field Cornetcy of the Worcester Division, the following averages (in lbs. per acre) for the several Field Cornetcies and Divisions are calculated:—

TABLE IV.

Divisions and Field Cornetcies.	Lime.	Potash.	Phosphoric Oxide.
I. PAARL.			
French Hoek	384	686	494
Groot Drakenstein	306	366	1,034
Achter de Paarl	512	672	752
Paardeberg and North Paarl ..	646	400	580
Groeneberg & Wagenmakers Vallei	200	566	430
Averages	400	570	624
II. WORCESTER.			
Wagenbooms Rivier	1,870	770	860
Goudini ..	606	400	200
Voorste Boschjesveld .	6,092	1,116	640
Over Hex River .	3,620	1,988	1,064
Worcester .. .	1,430	1,840	970
Achter Hex River .	1,800	1,856	1,044
Averages .	2,662	1,642	862

On the whole it may be said that the Paarl soils turn out rather poor in lime, potash and phosphoric oxide, while the average amount of nitrogen they contain is about normal. Taking the field cornetcies of this division separately, there is a lack of lime in every case, while potash may be said to be present in fair proportion in the Groeneberg and Achter de Paarl field-cornetcies but deficient throughout the rest of the division. The Groot Drakenstein and Achter de Paarl field-cornetcies show a fair amount of phosphates, but elsewhere this is lacking. There is a good amount of nitrogen in the soils of South-Western Paarl, that is to say, the field cornetcies of French Hoek, Groot Drakenstein and Achter de Paarl, and a fair quantity in the rest of the district.

Taking the soils of the Paarl division singly, they are all poor in lime except perhaps No. 14 from "Kuilenberg," which may almost be called fair in this respect. With regard to potash, No. 4 contains the normal quantity, Nos. 2, 14 and 21 a fair amount, but all the rest are deficient. As far as phosphates are concerned the condition of the land is, generally speaking, somewhat better: No. 15 contains a good quantity, there is a fair amount in the soils represented by samples 8, 9, 13, 14, 17, 19, 21 and 22, but the others are poor. With respect to nitrogen, there is a fair proportion in samples 3, 5, 6, 12, 16, 18, 19, 20, 21 and 23. Nos. 1, 2, 4, 7, 8, 13, 15 and 22 show a good percentage and Nos. 9, 14 and 17 are rich. The quantity of nitrogenous material in Nos. 10 and 11 is deficient. No. 14 is apparently one of the best all round soils in the division.

Turning to the Worcester Division, we find matters much better; there is, as a rule, a fair amount of lime, potash and phosphoric oxide in the soil, and also a good quantity of nitrogen. As to the separate field cornetcies, there is a fair quantity of all three inorganic plant food constituents in the Wagenbooms River field cornetcy, which is moreover rich in nitrogen. Goudini has a good quantity of nitrogen and phosphoric oxide, but is poor in lime and potash. At Voorste Boschjesveld the phosphates are deficient, but there is a fair amount of potash and nitrogen, and the lime is normal. The Over Hex River area shows a normal amount of potash, lime and phosphoric oxide in fair quantity, and a good percentage of nitrogen. The potash content is also normal in the Worcester field-cornetcy soils, and the phosphoric oxide and nitrogen fair, but lime is on the whole rather poor. The field cornetcy of Achter Hex River contains a fair quantity of all four constituents. Considering the soils of the division individually, one (No. 33) is rich in lime, Nos. 38 and 43 are normal, Nos. 25, 26, 36, 37 and 39 contain a fair amount, the rest are poor with respect to this one constituent. The amount of potash is normal in Nos. 33, 38, 42 and 43, there is also a fair quantity present in Nos. 25, 31, 32, 36, 37, 39, 40 and 41, the remaining nine soils being poor in potash. Eight soils are poor in phosphates; Nos. 24, 25, 36, 37, 38, 40, 41, 42 and 43 contain phosphoric oxide in fair proportion, No. 28 contains a good quantity, and No. 29 is actually rich in phosphatic material. Nitrogenous constituents are positively deficient in only one soil of this district, namely No. 34. There is a fair percentage in Nos. 26, 30, 35, 39, 41, 42 and 44, a good proportion in Nos. 27, 29, 31, 32, 33 and 43, while samples 24, 25, 28, 36, 37 and 38 are rich in nitrogen. No. 34 is a very poor all round soil, and Nos. 30 and 35 not much better.

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Govt. Analytical Laboratory,
28th February, 1902.

HORTICULTURE.

Practical Orchard Work at the Cape.

(*Continued from page 305.*)

MEANS OF ENSURING THE PROPER MECHANICAL CONDITION OF THE SOIL.

14. We will assume that the cultivator has the conviction firmly established in his mind that success depends upon the degree of completeness with which he can make his soil resemble the mechanical conditions present in a sponge. The foundation of his practice must be the maxim that trees do not grow in earth alone, but in a mixture of earth, air and water. That mixture is soil, if the word is properly understood; and his first care is to convert the earth of his erven into soil. The difference between the two is something like that which exists between the rudest barbarism and a high civilization. Little or nothing is possible to the former; everything is possible to the latter.

SELECTION OF A LOCALITY.

15. No great reflection will be needed to show that the proper selection of a locality for an orchard may very materially diminish the amount of labour and expense requisite to produce the mechanical conditions so much to be desired. Unless absolutely shut up to a definite acreage without a chance of skilled selection, no person would attempt to make an orchard upon a compact clay, or in a place where the level of the ground relatively to other properties rendered it the recipient of surplus water from above. It is essential, even when a man can choose his ground, and receives no seepage from his neighbours, that there be the freest possible outlet for his own drainage, whether of rain water or that which he supplies by irrigation. Yet one frequently sees the fruit-tree patch located in a mere sump, where in winter the water will weep into a hole made but one spit deep,* and that without the least effort being made to lower the water-table permanently by drainage, so that it shall never reach the level of the average depth of the roots. The locality then should be on a gentle slope to ensure the best water conditions, so as to fulfil the proverbial saying—"soon on and soon off," which concentrates in itself a good deal of gardening wisdom. In another place other conditions of selection, particularly that of aspect and shelter, will be dealt with.

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* In gardener's English a *spit* is the amount of earth taken out by one effort of the spade.

16. By far the most thorough and satisfactory method of inducing the desirable spongy condition of the soil, is the simple yet expensive and laborious operation of trenching. Much has been done by the implement-maker to effectively break up raw earth and let vital air into it; but for the most part these mechanical appliances, however successfully they deal with such tilth as may suit cereals or even root crops, do not go deep enough for the best orchard preparation, except at an expense for steam-gear which brings their work pretty close to the cost of the much more effective hand labour of trenching. At least this is the case with the imported appliances available here. The great thing to be wished for in this regard is that the fruit-grower shall deal as handsomely by his orchard as he has, through long custom and prescription, habitually dealt by his vineyard. The depth to which the trenching should penetrate depends greatly upon the nature of the soil. It must be remembered that if in clay-land it penetrates only two feet, the drainage of the winter rains and much of the irrigation-water in spring and summer will creep along that two-feet level. The deeper therefore, under such circumstances, the cultivator pushes such trenching, by so much does he lower the water-table, and give his trees immunity against water-logging of their roots. Should the soil be sandy and naturally open, rapidly relieving itself of surplus water by percolation downwards as well as along its natural slope, the necessity for deep trenching is not so absolute, and limits itself more particularly to the aëration of the soil. Under any circumstances, however, a sufficient number of well-planned French drains should be taken out down the main slope in every part of their course, and should descend into the subsoil a little lower than the depth to which the trenching has been regulated. This excellent system, perhaps the only one that will for a long time be in use in this country, consists of a V-shaped trench cut down into the subsoil straight along the main slope of the land. The greatest care must be taken to leave the bottom of the trench unbroken, and in an exact plane. Clearly if its bottom wavers in the least the water will not get a free outflow, pools will form in its course, and much of the value of the drain will be lost. To one unaccustomed to earthwork it would seem the simplest thing in the world to take out a drain, but it is really a skilled operation, and only a labourer who has practised it under a sharp foreman will carry out the true plane requisite for the bottom water-flow without many mistakes and repeated patchings. Remember that whenever the subsoil-floor of the drain has been taken out too deep, and has to be repaired and fetched into line by ramming material into it, you will have a soft place, where the water has a tendency to hang. It is therefore very good policy to employ for this task men who have had considerable practice, seeing that the work is better done, and more economically, because more rapidly executed. It is not necessary that the bottom of the trench should be of the full width of an ordinary spade. Draining spades for the special purpose of finishing off such work are made barely six inches wide, and there is economy in their use. The usual custom

is to fill the channel with rounded river pebbles, or similar rubble, to a depth of about nine inches or a litle more. Angular fragments of stone are to be avoided if possible, as they do not give nearly such large interstices, and they are much more apt to cause clogging and stoppage. Upon the top of this pebble-bed it is customary to put a layer of brushwood or *takkies*, well battened down. The only object of so compressing the brushwood is to work the layer together and prevent filling from soil dropping through it into the pebble-bed. Some time in the near future when cultivators have found out that a little capital buried under the surface of the soil, which gives them their returns, is a profitable outlay, we shall do something better than cover in our French drains with such poor stuff as brushwood, which in the nature of things cannot maintain its resistance for more than a very few seasons. Ultimately it must moulder away and help to fill the openings in the pebble layer. The better method, and the one which will ultimately be followed by progressive men, will be to buy up galvanized iron sheets that have served their purpose above ground, cut them into strips about a foot wide, and make them serve for drain roofing under ground, just as they may have served as house roofing above. A coating of gas tar on both sides will probably double the length of their underground spell of service. It is not too much to say that the term of usefulness of a French drain covered in with galvanized stripping will treble or quadruple that of one in which the covering material has been the porous and easily rotting brushwood.

17. But after all the French-pebble drain, however great improvement it may be upon our present system of either open sluits or no drainage at all, is far from being a perfect thing. Those that come after us will undoubtedly have something to say about the ever recurring necessity for taking up these make-shift affairs, cleaning them out, and giving the water once more a free passage. They will then have little hesitation in doing precisely what English farmers, from one end of the country to the other, have already done, even upon land on which they are merely tenants and not the owners, that is, the laying down of permanent drain-tiles. Properly laid, these drains outlast several generations of farmers, carry off the water with three or four times the certainty and swiftness of the French drain, and never clog up. There is at least one example on the Cape Peninsula of work of this class, and by its means an immense acreage of worthless drowned land, on which cattle could not venture without risk, has been converted into one of the most productive market-farms to be seen in the country.

18. The gospel of trenching and draining is a hard one; it means considerable outlay long before a return can be expected, and the customs of the country in everything connected with land seem to have been based upon a general theory of no capital and snatch-crops. It is not thus that fruit-farming is made a commercial success otherwheres. A certain sort of success, although decidedly not the best, may be attained by spreading the total expenditure in trenching

over several years. Thus an orchard of say 20 acres,* upon a gentle slope, may be trenched up in strips of land straight down the incline with a drain alongside each strip. For example, let the trenched piece No. 1 be laid off 20 feet wide and the drain to follow.

I.
Plot 20 ft. wide, trenched up 1st year.

DRAIN.

II.
Plot 20 ft. wide, ploughed for snatch-crop the 1st year,
trenched in 2nd year.

III.
Plot 20 ft. wide, trenched up 1st year.

DRAIN. →

IV.
Plot 20 ft. wide, ploughed for snatch-crop the 1st year,
trenched in 2nd year.

MAIN TFALL DRAIN

The next plot of 20 feet is ploughed up the first year and used for a snatch-crop. In the second year it is trenched exactly as was No. I. Next to this lies the third plot trenched up at the same time as No. I. Then comes a second line of drain, followed by plot No. IV., treated as was No. II. for a first year's snatch-crop and a second year's trenching. And thus the alternations go on over the whole area. By this means about half the cost of complete trenching an acre to be devoted to fruit culture would be distributed over perhaps two or three years. The great thing, however, to be enforced is that a scamping treatment of the ground, which would be avoided by every good wine-farmer if proposed to be applied to a vineyard, is for the same reasons and in the same measure, not good enough for fruit-trees. At least let the peaches and apricots, the oranges, apples and pears get the same chance dealt out to them which we accord to the vine.

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* At present there is scarcely any such thing in this country; what we call orchards, a Californian or Florida grower would call a "fruit-garden."

MANURING OF ORCHARD GROUND.

19. During the time of trenching is the best time for manuring the ground if its natural poorness requires that assistance. The old method of putting a basket of manure in a hole near the foot of the tree will not do at all. But as the strata of spaded earth are taking their new position, a labourer is told off with the six-pronged fork to scatter the manure between their layers. By this means the manurial ingredients are diffused pretty evenly throughout the whole mass. If your supply runs short, let the third foot of the depth go without the dung, and give what you have to the upper two feet. With a still shorter supply you will have to be very sparing. You will find it more thrifty to have the top spit of the ground left very rough. Then scatter what manure you have over the ragged surface, and turn it in when you finally level it down to a cultivable smoothness. Practically this amounts to a top-dressing only. Where you are working with a clayey soil, manure that is not particularly rich in animal matter, but contains much of incompletely decomposed straw, finds its best use in assisting aëration and preventing the packing together of the soil.

Do not suppose that in such soils as fall to the lot of the average fruit grower at the Cape, there is necessarily a call for much manuring. We are very apt to look upon manuring as a sort of cure-all, which with excessive irrigation is to save us the labour of trenching up the soil, pruning the trees to fruiting condition, and looking well after them generally. Have we not given them plenty of rich compost? Then why don't they bear satisfactorily? The fact is the majority of fairly fertile soils that have been industriously cultivated will suit fruit trees without other manure than a light top dressing, for years, if only they get the inevitable and necessary opening-up by trenching. Heavy manuring is the cultural need of annual crops which have to spring up, blossom and seed at racing pace, to get through with their short lives within the year. Your fruit trees do not take life so fast, and they therefore do not require the stimulus appropriate to cereals and root-crops whose work is done in five or six months. The parallel of the vine, which takes an enormous manure supply every second or third season, does not run exactly on all fours with the apple, peach and pear. These trees and their like are not every year cut back to mere skeletons of their former selves, and have not to make a forest of bearing wood betimes to carry the great crop of fruit they proffer to the farmer. The vine's annual output is excessive compared with that of ordinary fruit trees, especially when you consider how small an average vine is and how much larger an orchard tree. But common sense will show that the more deliberate growth and more limited fruiting of the orchard calls for less manurial enrichment.

LAYING OUT AND PLANTING.

20. Let us suppose that by the means indicated, either the whole area of the orchard or the alternating 20-foot strips of which we have spoken, have been thoroughly broken up and converted into mellow, well-aërated soil. The drains have also been laid out and their trenches filled in. On no account will the judicious cultivator submit to have an open drain left upon land that he cares for. It is a waste of so much space. Its side-slopes inevitably become gardens of weeds and harbours for pests innumerable. The flume that brings the irrigation-water to the land must perhaps be open, and the evils of that openness must be put up with and kept in check by constant care. Some day, it is to be hoped in the near future, we shall either pave our water-flume with shale or some other material, the rejected wane-planks of the saw-pit, or possibly the same sort of galvanized iron that is doing duty in our French drains. We shall by this means get rid of the perpetual troubles arising from the damage to the banks by tread of feet and the enormous loss that accrues through soakage.

21. The next consideration is the laying out and locating the places for the trees. A few words may be given as to the surveying devices which go to make up correct laying-out. The simple method of staking two corners and putting in a few sticks for sighting scarcely needs description. A correct line down one side of the area is thus obtained. The difficulty is to lay off a true right-angle for the breadth-measure. The simplest way of doing this is to measure off 80 feet along the true side with a tape line and stake the point obtained. Then from the starting point measure along the other side 60 feet, drawing the tape as nearly as possible at a right-angle, judging by the eye, and put in a mark. Now, if the angle so made is a true right-angle, you will find that the diagonal or cross-line measure, from mark to mark and completing the triangle, will give you exactly 100 feet. If it is less, the 60-feet mark has been taken too far in; if it is more, then you have splayed it too far out, and in either case correction must be made until the 100-feet diagonal measures up correctly. Having thus got your true corner, the lines can be continued by the common method of sighting with upright sticks. Along the whole area parallel lines can be set out with great accuracy by measuring off the same distance along the two opposite sides, staking the points and putting up sighting-sticks between them. Upon these lines, at given distances, the tree-planting marks are to be placed. In this work, as in everything connected with measurements, it is best to do the whole job at once without a break. Doing the task of setting-out piecemeal invariably leads to irregular and unsatisfactory results.

22. The next point to be considered is one on which there are almost as many opinions as there are planters. It is the question of how many trees to put on an acre of ground, or rather, how near may you plant fruit-trees and get a good crop off them. The

question, however, should not be "How close can I stick my trees without being considered mean to them?" but rather "What distance apart would be the best for their healthy growth?" The tendency is naturally to put them far too near each other, because they come to the ground mere yearlings from their date of grafting, and are so small that it requires the planter to be next door to a prophet and have a prophet's imagination to enable him to figure to himself the size to which they will grow in five or six years' time. The best check to a niggardly appropriation of space is to keep in mind that whatever interval you allow, the foliage-head of two adjoining trees must necessarily go halves in it; and what is true of the branching head is equally true of the branching roots, which just as certainly share the feeding-ground between them. The smallest distance which can be allowed between tree and tree is 20 feet apart. Set squarely, this will give 109 trees to a square of exactly one acre, and is the smallest allotment that can be allowed for standard trees if they are to do any good. The more liberal allotment of 22 feet apart, giving 90 per square acre, will probably pay better in the long run. In other countries the result of experience is all on the side of generous allotment of space, and new orchards are being set out with wider distances year by year. For dwarf trees, such as are decidedly best fitted to withstand the violent winds of this country, and which require much less screening-shelter, a distance of 18 feet apart will be found sufficient. It gives 134 trees to the aforesaid square of one acre. If you skimp the distance and think to advantage yourself by putting such trees 14 feet apart with a total of 222, or 10 feet apart with 435 to the square, you will find yourself puzzled to get your plough or even your cultivator to turn between them when you are working the tilth to eradicate weeds. Therefore hold fast to the minimum of 18 feet apart even for dwarfs. In laying out these distances along the parallel lines that you have set out with your sighting-sticks, be sure to arrange so that the rows shall, as it were, break joint; any one tree of a row being opposite to a blank space in the next row. The device is of universal use in vineyards. The underground feeding space of the roots is thereby more evenly divided, and the effect of high wind very much diminished, because there is so much less opportunity for the wind, as the foresters say, "getting into the wood." If the boundaries of your ground are already laid out and incapable of alteration, you will have to be content with thus much done in foresight of danger from the wind. You can do no more except you plant a wind-screen of Lombardy poplars, to stand up in the eye of the wind and break it up into air-spray. It is astonishing what an amount of gusty weather these quincunxes or sets of five (for into that pattern they naturally run), will bear up against without damage, because each tree is more or less a safeguard to two of its neighbours down the wind. But supposing that you can take your pick of land previously unenclosed, then bethink you so to place your orchard as to hang diagonally across the wind-run, not with a hard line at right angles to it. Yet such common sense is often forgotten, and the line is drawn straight across the brute force of the prevailing winds, instead of half coaxing, half slipping it aside.

(To be continued.)

STOCK FARMING.

Mohair Industry.

REPORT.

In accordance with arrangements made before leaving for England, I received two Angora skins, and a fine skirted fleece of Mohair of nine months growth shorn from a yearling goat belonging to Mr. G. G. Lee of Klipfontein. With these samples of Mohair I visited the factory of Sir Titus Salt, Sons & Co. at Saltaire, with the object of ascertaining from the experts there the reason, or reasons, why the Cape Mohair cannot command the same price as the Turkey Mohair, although the opinion is widely entertained—and with good reason—that the leading Angora farmers of this Colony possess more carefully bred goats and flocks of a more uniform quality than are to be found in Asia Minor.

I was received in the most cordial manner by the Manager of the Works, Mr. Roberts, who discussed the matter frankly from the manufacturer's point of view, and deputed his son, who was out in the Cape Colony for some years, to take me round the Works, and show me all the processes of the manufacture of Mohair into its various fabrics. I was also shown a large quantity of Cape and Turkey Mohair as it was taken out of the bales respectively. I may here remark that the sample fleece which Mr. Lee supplied was an excellent specimen, and almost equal in quality to anything that I saw at the Works, but the general character of Cape Mohair was stronger and harsher to the touch than the average Turkey Mohair, although many of the bales of the latter contained manifestly cross-breds far from being so uniform in character as the Cape Mohair.

I selected four specimens of Turkish Mohair, which are described by Mr. Roberts in his letter of the 15th January, 1902. Sample 1 was taken from a bale in which there were hardly two fleeces alike. The one selected is a medium sample, manifestly from a half-bred goat, and yet Mr. Roberts describes it as "a light character of hair part cross-bred in, but has plenty of quality owing to which it fetches a fair price." It is evidently a fleece from a class of goat that no leading Cape Angora farmer would retain in his flock, still the fact remains that our Angora farmers are not realizing the full benefit of their care and enterprise. When indifferently bred goats in Asia Minor can produce a class of hair that commands almost as high a price from the Manufacturers as our best and purest bred, then either the conditions of food and climate in Asia Minor are more favourable for the production of Mohair of a soft, silky, lustrous character than the Cape, or else the Angora farmers here are making a mistake in the selection of their breeding stock, paying more attention to weight of fleece than to quality of hair. There is, however, another side to the question. It is quite possible that the most profitable Mohair to the Manufacturer may not be the most profitable quality of hair for the Angora farmer to cultivate. This is a matter for consideration, still I think that there should be a *via media* if it can be discovered. The best and most valuable hair should be aimed at, consistent with a reasonable weight of fleece.

I must not omit to direct the special attention of the Angora farmers to the last paragraph of Mr. Roberts' letter. It made me blush for the Cape farmers when I saw some of the stuff which was turned out of some of the bales of Cape Mohair. Mr. Roberts designated it as "false packing," but it deserves a stronger term, for I saw lumps of solid manure turned out of some of the bales.

I intend to take the samples of Turkish Mohair out to the Show Yard at Rosebank, and will endeavour to get a meeting of the Angora farmers to discuss the question there with the specimens before them; for this purpose I shall be glad also to have returned me to the correspondence on this subject, which I enclose for your information.

D. Hutcheon,
Colonial Veterinary Surgeon.

Saltaire, 15th January, 1902.

Herewith samples of Mohair promised.

1. Koniah. A light character of hair, part cross-bred in, but has plenty of quality, owing to which it fetches a fair price.
2. Angora. A class of hair to attain to, good bred and with fair quality.
3. Greasy. Solid, but nothing like as strong or harsh as greasy fleeces found in Cape bales.
4. Beybazaar. A nice solid hair, medium quality, good even length and free from kemps.
5. Mohair Top; out of bulk sort from Cape 1sts.
6. Mohair Top; out of bulk sort from Turkey Fair Average.

One or two things want impressing on the farmers: they should keep their flocks as regular as possible; class and skirt the fleeces well; and, above all, put a stop to that habit of false packing which is far too prevalent in South Africa. One reason of the advantage Turkey Mohair has over Cape in price is that the former is more regular, and the user can rely on getting the qualities he may require from time to time out of a less quantity, as there are less of sorts to be taken out.

SIR TITUS SALT, BART., SONS & CO., LIMITED.

MISCELLANEOUS.

Roots of the Maize Plant.

The advantages of maize as a fodder crop in a dry season are shown by some interesting experiments carried out a few years ago at the North Dakota Agricultural College, in order to ascertain the distance to which the root penetrated the soil to procure its nourishment. For this purpose an iron frame was constructed in the shape of a cube 5 or 6 feet in each of its dimensions, and was filled with shelves of wire-netting placed one above the other, with intervening spaces of about 2 inches. These frames were sunk in the ground entirely beneath the surface. Maize and wheat were then planted on the ground, and, as the plants grew, the roots were not obstructed by the layers of wire-netting embedded in the soil beneath, but forced their way readily through the meshes. In the autumn the frames were dug out and the soil washed away with water. The netting held the roots and rootlets in the very position in which they grew, and a valuable object-lesson for the study of root growth was presented. The roots of the maize plants had gone beyond the 6-feet limit, and some of the roots were broken off in removing the frame. In the case of the wheat, the rootlets had, in some cases, gone down to a depth of 4 feet.—*Queensland Agricultural Journal.*

Farming Then and Now.

A representative Australian recently returned to London from a trip to America, and gave his impressions to the *British Australasian*. He said:—"In Kansas everyone uses drills now; the broadcast seed-sowers have all been thrown on the scrap heap. By using seed drills and phosphates the crops can be almost doubled. While travelling through this farm country I was shown some very interesting figures. Forty years ago, to produce 1 bushel of wheat from beginning to end required three hours' labour. Now it only takes ten minutes. The cost of the human labour to produce this bushel was 1s. 6d. then. Now it is under 1½d. A ton of hay forty years ago, cut with a scythe and gathered in by hand rakes, required thirty-five and a-half hours of human labour. To-day, with horse-mowers, horse-rakes and horse-presses, it only takes eleven and a-half hours of human labour, and the cost of labour per ton of hay has fallen from 12s. 3d. to 5s. 6d. Agricultural labour is expensive in America, so they invented machinery. Agricultural labour is more expensive in Australia, so that is the greater reason for farmers there to adopt machinery. It will help the labourers, too, for more land will be cultivated, and many of them will be able themselves to acquire and work farms. Ah! There is another point of interest to Australians visiting America—the cheapness of the transit. Much of the prosperity of American farmers is due to the very low rates at which the railways carry their wheat. Railways are close to almost every farmer's door. These railways, of course, are run for a profit, and they are able to charge a low tariff on account of the quantity of cargo they carry. The Australian railways belonging to the Government should not be run as revenue producers; their earnings should only cover interest and sinking fund, and every inducement should be given to the farmers."

GOVERNMENT NOTICES.

Farmers' Apprentices. Dairy Assistants, &c.

As inquiries are from time to time received from young men from abroad as to where they may serve apprenticeship or gain practical experience of farming in this Colony, before starting on their own account, the Secretary for Agriculture invites Farmers who are willing to receive young men of good character, for this purpose, to register their names with the Under Secretary for Agriculture, stating the class of farming they do, how many young men they are prepared to take, and for what period they would enter into an agreement.

It is not probable that these young men will be in a position to give more than their free services in return for the experience they will gain; that is, they will not be able to pay any fee; and they will look to receiving free board and lodging in return for their services.

It is to Farmers, therefore, who are willing to grant such young men free board and lodging in return for services rendered, that this application is especially addressed.

With reference to the above notice to Farmers, the Secretary for Agriculture now invites young men who are willing to engage themselves as Farmers' Apprentices in Cape Colony to register their names with the Under Secretary for Agriculture, Cape Town. The apprentice will gain experience in farming in South Africa, and have an opportunity for spying out the land before starting on his own farm. To the new comer from another country this is essential, for he has much to learn and unlearn.

Many applications for such Apprentices have been received from Farmers in the Colony. It will be noted that the Apprentice will neither receive wages, nor pay a fee. He will get free board and lodging in return for his services, and at the same time acquire the experience he is in need of.

Applications for employment have also been received from several Lady Dairy Experts and Dairy Assistants; and Dairy Farmers and others desiring to avail themselves of the services of such are invited to register their names with this Department, giving particulars as to situation and extent of operations, etc., and salary and other emoluments they are prepared to offer.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM BASUTOLAND.

By command of His Excellency the Governor, the following Proclamation No. 164, 1901, was published in the Government Gazette of October 29th, 1901:—

Whereas by Proclamation No. 100, bearing date the 4th day of June, 1901, I did, by reason of the existence of the disease amongst cattle known as Rinderpest in the Territory of Basutoland, prohibit the introduction of horned cattle from the said Territory into this Colony:

And whereas the said disease has spread to the portions of this Colony which adjoin the said Territory, thus rendering it unnecessary to longer maintain the prohibition imposed by the said Proclamation:

Now, therefore, under and by virtue of the powers and authorities in me vested, I do hereby proclaim, declare and make known that from and after the date hereof the prohibition upon the introduction of horned cattle from Basutoland into this Colony shall be removed: the said Proclamation No. 100 of 1901 being hereby repealed accordingly.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM ORANGE RIVER COLONY AND THE TRANSVAAL.

By command of His Excellency the Governor, the following Proclamation No. 139 1901, was published in the Government Gazette of August 16th, 1901:—

Under and by virtue of the powers vested in me by the "Animal Diseases Act," No. 27 of 1893, and by the "Animals Diseases Rinderpest Amendment Act," No. 2 of 1897, I do hereby proclaim, declare and make known that it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced into any part of this Colony from the Orange River Colony and the Transvaal, save and except such cattle as may be required to be introduced by the Government for the purpose of supplying Bile or Serum for inoculation against Rinderpest:

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed

And I do hereby further declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

Proclamation No. 217, bearing date the 29th day of October, 1900, together with the regulations issued thereunder, is thereby repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined Regulation for checking the spread of the infection is republished.

REGULATION ISSUED UNDER PROCLAMATION No. 30, DATED 20TH JANUARY, 1899.

Whenever under the provisions of Sections 11 and 12 of Act No. 27 of 1893, any area is declared or proclaimed to be an area infected with Rinderpest, it shall not be lawful for any person, animal, animal produce, article or thing, who or which may, in the opinion of the Magistrate of the District in which such area is situated, be liable to convey infection of Rinderpest, to leave or to be removed therefrom.

Inoculation Against Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of the Colony, it is desirable to inform stock-owners of the intentions of the Government as to dealing with the outbreak should it unfortunately become general in the Colony, and to advise stock-owners as to the best course to follow.

The Government propose that, as a general rule, cattle-owners themselves should perform the inoculation. Glycerinated Bile will be used, though circumstances may arise where it will be preferable to use Serum.

Bile Stations will be established in suitable places as necessity arises in localities where farmers have agreed to contribute the required proportion, say 5 per cent., of their cattle for production of the bile. It must be clearly understood that unless farmers are prepared to thus contribute the necessary cattle, it will be impossible for them to have the benefit of a Bile Station.

Glycerinated Bile will be issued free to contributors in proportion to the number of cattle contributed to a Bile Station. To non-contributors a fair charge will be made for bile if any be available for issue.

Serum will be charged for at the rate of £1 per bottle of ten doses.

A limited supply of Glycerinated Bile to meet emergencies will, for a time, be available, free of charge, from the Bile Station which has been established under arrangements with the Imperial Military authorities near Aliwal North.

As occasion requires, Demonstrators will be sent to instruct farmers in the method of inoculation, free of charge. They will, as a rule, inoculate only enough cattle to show how it is to be done, leaving the owner to continue the work. The Government will supply syringes on application to the Resident Magistrate, or to the Demonstrators at the following charges: -20 cc. capacity, 20s; 10 cc. capacity, 15s. This payment may be recovered on return of the syringe to the Magistrate, in good order.

After the experience gained during the outbreak of 1896-1898, the Colonial Veterinary Surgeon wrote* as follows:—

"The method of inoculation which I would recommend in future sporadic outbreaks of the disease is briefly as follows:—

"*Infected Herds.*—These should be inoculated at once with either serum or glycerinated bile; every animal which indicates infection by a rise of temperature should receive a large dose of not less than 100 cc. of serum, or 30 cc. of glycerinated bile; the latter should, by preference, be injected into the jugular vein, so as to secure its immediate action. Then from eight to twelve days after, all the animals in the herd which give no indication of being infected with the disease, or fever temperature, should receive an injection of pure bile; not less than 10 cc., and for large animals 20 cc. This will confer a lasting immunity sufficient for all practical purposes.

"*Clean Herds.*—When it is decided to inoculate a clean herd, which is in danger of becoming infected through its proximity to diseased cattle I would recommend that the animals composing the herd should be inoculated first with 20 cc. of glycerinated bile, and to follow this inoculation in from eight to twelve days with an injection of from 10 to 20 cc. of pure bile. This will confer a strong and lasting immunity on the animals in the herd, and will be free from risk arising from the inoculation or of introducing the disease.

"*Use of Pure Bile.*—Pure fresh bile should not be used in an infected herd, if any of the other inoculating materials can be obtained, as it tends to intensify the character of the disease in those already infected, and its immunising effect is too slowly developed to protect the healthy cattle against infection, if they are left in contact with those already sick. If no other means are available, however, the temperatures of the whole of the cattle in the infected herd should be carefully taken by the clinical thermometer, and only those which register a normal temperature should be inoculated with pure bile, the others should be separated from the inoculated lot at once, and carefully tended. If glycerine can be obtained, the spare bile should be mixed with it in the proper proportions—one part of glycerine to two parts of bile. This mixture, after standing forty-eight hours, may be injected into the affected animals in large doses, not only with safety, but with marked benefit.

"*Preparing the Bile.*—The bile should be taken from an affected animal immediately after death, or from one which is killed in the last stage of collapse.

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* See *Agricultural Journal*, June 8, 1899, in which will be found a full consideration of the different methods of inoculation.

" Biles of all shades of colour—except those which are red from the presence of
" blood—may be used, so long as they are clear and free from a putrid smell. Thin
" light yellow biles should also be rejected.

" All the galls extracted at one time should be mixed together, after standing sepa-
" rately for twelve to eighteen hours, so as to render them uniform in strength and
" immunising properties. Pure bile should be used on the second day after being
" drawn, unless it is kept in an ice chest, when it may be kept sweet much longer. But
" if pure bile is used as a second inoculation only, as above directed, it is not desirable
" to keep it longer than twenty-four hours.

" Glycerinated bile is made by adding one part of glycerine to two parts of bile, stir
" the mixture well, then mix all the biles taken at one time, and allow them to stand
" for eight days. But if there is urgency, the glycerinated bile may be used forty-eight
" hours after it is mixed.

" I would strongly recommend that in every outbreak of the disease that occurs,
" every drop of suitable bile, obtained from the animals which die, should be mixed
" with glycerine in proper proportions, two parts of the bile to one of glycerine, so that
" it may be preserved and made available for the inoculation of infected herds, and also
" for the first inoculation of clean herds which may be considered in danger. Pure
" bile for the second inoculation of clean herds can always be obtained when the
" disease appears in any locality, which would be the only reason for inoculating clean
" herds in the immediate vicinity."

Taking the Bile.—To remove the bile the animal must be laid on its left side, the skin and flesh on the right side immediately behind the last rib being cut through; the ribs being raised, the gall bladder will become visible. The gall bladder should be then punctured with a small knife and the gall allowed to escape into a wide-mouthed bottle. If wide-mouthed bottles are not available then ordinary whisky bottles may be used with an *enamelled* funnel, which can be procured at any country store. Every precaution must be taken that the operation is performed in a thoroughly clean manner, the hands of the operator and all knives, &c., being thoroughly cleansed before use.

Inoculating.—After having secured the animal to be operated upon, the necessary dose of bile is injected under the skin of the dewlap by means of a Hypodermic Syringe, care being taken that the point of the needle is not inserted into the flesh, but between the skin and flesh.

Symptoms of Rinderpest.

The Outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined description of the symptoms of Rinderpest is hereby published:—

The early symptoms of Rinderpest are a rise of internal temperature to 106 or 107° Fahr.; the animal stands with its head hanging down, ears drawn back and coat staring; it refuses all food and occasionally shivers. A mucous discharge flows from the eyes and nostrils; the extremities are cold, and the breathing is laboured and frequently accompanied with moaning. The inner part of the upper lip and roof of the mouth and all visible mucous membranes are reddened, and covered with an eruption of minute pimples, and later with a branlike exudation. The bowels are occasionally constipated, but in most cases diarrhoea sets in, the evacuations being slimy and very frequently of a dirty yellow colour. The prostration of strength is great, the animal staggering when made to move. In milch cows the secretion of milk is rapidly diminished, and soon ceases altogether. The disease usually ends fatally in from six to ten days.

It is generally believed that the infection is produced through the respiratory organs; from there the contagion becomes generalised. The contagion exists in the secretions and excretions, urine, saliva, mucous secretions of the nose, mouth and eyes, in the sweat, expired air, blood, and in all the tissues. It may be conveyed directly by the diseased animals, or indirectly by the dung, the bedding, the earth, hides, wool, meat, clothing, wagons or vessels, by people, dogs, sheep and chickens, &c. Contagion takes place only through short distances. When the weather is dry this is reduced to its minimum (about 27 yards), and the progress of the disease may be stopped by a ditch separating the diseased from the healthy animals.

In order to detect the earliest symptoms of Rinderpest, owners of horned cattle are warned of the urgent necessity for keeping a constant and close watch upon their stock. Any suspicious cases should be immediately reported to the nearest Resident Magistrate.

Field-cornet or Police Officer, and the sick animal kept separate till an inspection is made. Stock should be carefully examined daily by a responsible person, more particularly for any symptoms resembling those above described.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October, 1900:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

- (*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and
- (*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie

Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B' hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz.:—

Number and general description of Cattle ....
....
....

Owner's name and address ....
....

In charge of..

Place to which Cattle are being sent..............................

(Signature).
(Address).

Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature..
(Address)..

Date.....................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle ....
....
....

Owner's name and address ....
....

In charge of..

Place to which Cattle are being sent..............................

(Inspector's signature)..
(Address)..

Date...................

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be a follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Tobacco Seed.

A small consignment of the following varieties of Tobacco Seed, viz.:—White Burley Havana, Yellow Oronoko, Virginia "One Sucker," Virginia Pryor, Blue Pryor, Connecticut Seed Leaf, and Maryland, have been obtained from America by the Agricultural Department. Sumatra, Long Leaf Gooch and St. Felix are shortly expected.

Applications, accompanied by the deposit of 5s., should be addressed to the Under Secretary for Agriculture, Cape Town; and will be dealt with in order of receipt.

The seed will be distributed in lots not exceeding 3 oz. each of any three of the above-mentioned varieties upon deposit of the sum of 5s. by each applicant, which amount will be refunded by the Government to all applicants who furnish a report in due course, giving full particulars as to the mode of cultivation adopted and the results obtained.

TOTAL RAINFALL FOR 1901.

[R.N.C.—Returns not complete.]

I. CAPE PENINSULA:	INCHES.
Royal Observatory (a) 12 inch gauge	25·68
Cape Town, Fire Station	27·41
Do. South African College	33·51
Do Sea Point (Hall)	23·82
Do Molteno Reservoir	35·24
Do Platteklip	47·44
Do Signal Hill	20·94
Table Mountain, Disa Head	r.n.c.
Do Kasteel's Poort	61·34
Do Waai Kopje	64·62
Do St. Michael's	72·67
Devil's Peak, Block House	60·54
Do. Nursery Gauge	52·65
Do. Lower Gauge	44·36
Rondebosch	44·12
Newlands (Montebello)	r.n c.
Bishopscourt	56·62
Claremont	41·06
Kenilworth	48·07
Wynberg (St. Mary's)	41·14
Groot Constantia	44·66
Tokai	35·49
Simon's Town (Wood)	30·96
Do. (Gaol)	29·35
Blaauwberg Strand	14·56
Robben Island	17·02
Strandfontein	19·88
Camp's Bay	23·80
Fish Hoek	22·32
Cape Point	11·72
Smith's Farm	r.n.c.
Durbanville	24·43

II. SOUTH-WEST:	INCHES.
Eerste River	r.n.c.
Klapmuts	27·67
Stellenbosch (Gaol)	28·59
Somerset West	25·81
Paarl	33 07
Wellington (Gaol)	27·29
Do. (Huguenot Seminary)	r.n.c.
Tulbagh	19·87
Kluitjes Kraal	28·20
Ceres	42·23
Rocklands	22·12
Caledon	23·31
Worcester (Gaol)	13·67
Do. (Meiring)	r.n.c.
Hex River	17·29
Lady Grey (Div. Robertson)	11·80
Robertson	16·54

II. SOUTH-WEST—*continued.*	INCHES.
Robertson (Govt. Plantation)	18·72
Groot Drakenstein	33·01
Montagu	18·86
De Hoop (Div. Robertson)	17·42
The Oaks	r.n.c.
Rawsonville	26·41
Weltevreden (Div. Caledon)	29·15
Danger Point	20·60
De Doorns	13·53
Piquetberg Road	r.n.c.
Ceres Road	19·99

III. WEST COAST:	INCHES.
Port Nolloth	2·34
Do. (Howard)	r.n.c.
Klipfontein	6·96
Kraaifontein	4·68
O'okiep	6·79
Springbokfontein (Gaol)	9·60
Concordia	6·60
Garies	r.n.c.
Kersefontein	11·58
The Towers	20·98
Dassen Island	19·20
Malmesbury	r.n.c.
Piquetberg	20·09
Van Rhynsdorp	r.n.c.
Clanwilliam (Gaol)	r.n.c.
Do. (Seydell)	7.90
Welbedacht	r.n.c.
Hopefield	14.41
Lilyfontein	r.n.c.
Wupperthal	10·39
Zoutpan	12·39
Anenous	4·92

IV. SOUTH COAST:	INCHES.
Cape L'Aguilhas	16·19
Bredasdorp	21·02
Swellendam	35·89
Heidelberg	22·68
Riversdale	19·07
Zuurbraak	35·93
Geelbek's Vlei	17·34
Mossel Bay	18·10
George	38·66
Ezeljagt	18·61
Millwood	49·49
Sour Flats	35·85
Concordia	42·49
Knysna	29·06
Buffels Nek	52·61

IV. SOUTH COAST—*continued.*	INCHES.
Harkerville	38·52
Plettenberg Bay	22·58
Forest Hall	29·55
Blaauwkrantz	35·98
Storm's River	40·74
Witte Els Bosch	39·81
Humansdorp	26·07
Cape St. Francis	29·61
Hankey	15·82
Witteklip	35·43
Van Staaden's (upper)	31·05
Do. (lower)	35·26
Uitenhage	18·34
Do. (Inggs)	16·59
Dunbrody	13·89
Port Elizabeth (Harbour)	20·38
Walmer Heights (near Port Elizabeth)	30·53
Tankatara	17·16
Lottering	36·68
Shark's River (Nursery)	23·13
Do (Convict Station)	21·87
Grootvader's Bosch	r.n.c
Karnmelks River	21·97
Armadale	19·42
Vogel Vlei	23·33
Victoria Park, P.E.	20·77
Great Brak River	24·10
Melkhoutfontein	17·40
Uitenhage (Park)	r.n.c.
Centlivres	14·54
V. SOUTHERN KARROO:	
Touws River (D.E.'s Office)	9·04
Do (Station)	r.n.c.
Ladismith	15·10
Amalienstein	17·25
Calitzdorp	12·50
Oudtshoorn	12·10
Vlakte Plaats	r.n.c.
Uniondale	12·91
Kleinpoort	r.n c.
Glenconnor	r.n.c.
Triangle	12·11
Grootfontein	5·72
Pietermeintjes	11·04
Bok River	16·06
Verkeerde Vlei	10·77
Seven Weeks Poort	r.n.c.
VI. WEST CENTRAL KARROO:	
Matjesfontein	
Prince Albert Road	2·30
Fraserburg Road	6·98
Prince Albert	7·68
Zwartberg Pass	84·06
Beaufort West	9·88
Dunedin	6·02
Nel's Poort	8·40
Camfer's Kraal	8·15
Lower Nel's Poort	9·46
Baaken's Rug	8·99
Willowmore	7·48

VI. W.C. KARROO—*continued.*	INCHES.
Steytlerville	6·07
Roosplaats	4·43
Laingsberg	4·81
VII. EAST CENTRAL KARROO:	
Aberdeen (Gaol)	13·13
Do. (Bedford)	15·38
Aberdeen Road	r.n.c.
Rietfontein	8·59
Winterhoek	17·68
Klipdrift, De Erf	12·76
Kendrew (Holmes)	14·55
Do (Edwards)	13·38
Graaff-Reinet	15·15
Do. (College)	15·00
New Bethesda	16·69
Roode Bloem	13·94
Wellwood	16·11
Do. (Mountain)	12·56
Jansenville	10·78
Patrysfontein	16 27
Toegedacht	11·35
Klipfontein	13·46
Cranemere	15·35
Pearston	16·57
Walsingham	17·01
Somerset East	27·68
Do. (College)	29·68
Longhope	11·25
Middleton	r.n.c.
Corndale (Div. Aberdeen)	r.n.c.
Cookhouse	16·82
Doornbosch, Zwagershoek	r.n.c.
Middlewater	12·42
Darlington	r.n.c.
Bloemhof	16·51
Arundale	r.n.c.
Graaff-Reinet (Engineer's Yard)	14·42
Glen Harry	14·23
Roode Hoogte	r.n.c.
VIII. NORTHERN KARROO:	
Calvinia	r.n.c.
Middlepost	r.n.c.
Sutherland	r.n.c.
Rheboksfontein	r.n.c.
Fraserburg	r.n.c.
Onderste Doorns	r.n.c.
Droogefontein	r.n.c.
Gannapan	r n.c.
Carnarvon	11·67
Wagenaar's Kraal	8·25
Brakfontein	10·63
Vogelstruisfontein	6·97
Victoria West	13·81
Britstown	17·08
Murraysburg	r.n.c.
De Kruis	r.n.c.
Richmond	r.n.c.
De Aar	16·88
Middlemount	13·48
Hanover	16·60
Philip's Town	17·56
Boschfontein	17·63

VIII. N. KARROO—*continued.*	INCHES.
Petrusville	19.46
The Willows	r.n.c.
Naauwpoort	r.n.c.
Middelburg (Begley)	11·41
Colesberg	21·23
Tafelberg Hall	r.n c.
Rietbult (Colesberg Bridge)	r.n.c.
Stonehills	12·84
Cradock	14·43
Do. (Rose)	14·09
Varsch Vlei	r n.c.
Witmoss	r.n c.
Steynsburg	21·87
Do. (Nesemann)	21·21
Daggaboer's Nek	19·16
Quagga's Kerk	r.n c.
Tarkastad	18·31
Drummond Park	17·57
Riet Vlei	16·69
Brand Vlei	r.n.c.
Omdraai's Vlei	r.n.c.
Zwagersfontein	r.n.c.
Varken's Kop	15·81
Culmstock	r.n.c.
Doorskuilen	17 97
Houwater Dam	r.n.c.
Hillmoor	19·24
Glen Roy	23·44
Fish River	r.n.c.
Spitzkop	r.n.c.
Phizantefontein	7·14
Biesjesdam	11 23
Groot Vlei (Theebus)	r.n.c.
Kleinhaasfontein	20·81
Spring Valley	15·69
Beyersfontein	13·67
Zeekoegat	12·62
Haasfontein	16·46
Maraisburg	17·59

IX. NORTHERN BORDER:	
Pella	1·27
Kenhardt	r n.c.
Van Wyk's Vlei	r.n.c.
Prieska	r.n.c.
Dunmurry	r.n.c.
Griqua Town	14·39
Campbell	17·48
Douglas	18·38
Avoca (Herbert)	14·24
Eskdale	12·52
Hope Town	13·44
Orange River	12·22
Newlands (Div. Barkly West)	19·58
Groot Boetsap	r.n.c.
Kimberley (Gaol)	21·67
Do. (Stephens)	21·27
Bellsbank (Div. Barkly West)	r.n.c.
Barkly West	22·27
Upington	r.n.c.
	r.n.c.
Rutla___	r.n.c.
The Halt	r.n.c.

IX. N. BORDER.—*continued.*	INCHES.
Karree Kloof	11·53
New Year's Kraal	10·80

X. SOUTH-EAST:	
Fairholt	22·80
Cheviot Fells (Bedford)	r.n.c.
Alicedale	r.n.c.
Bedford (Gaol)	26·00
Do. (Hall)	26·63
Sydney's Hope	22·96
Cullendale	23·72
Adelaide	18 12
Atherstone	18·71
Alexandria	22·07
Salem	19 12
Graham's Town (Gaol)	26·26
Do. (Bact.Inst.)	23·45
Heatherton Towers (near Graham's Town)	12·43
Fort Beaufort	17·30
Katberg	42·66
Do. Sanatorium	37 24
Balfour	30·54
Seymour	r.n.c.
Glencairn	32·57
Alice	22·29
Lovedale	r.n.c.
Port Alfred	19·89
Hogsback	47·69
Thaba N'doda	44·85
Peddie	18 91
Cathcart	27·88
Keiskama Hoek	22·81
Dynamite	20·98
Thomas River	22·43
King William's Town	22·36
Do. Hospital	r.n.c.
Stutterheim (Wylde)	29·33
Do. (Besté)	28·26
Dohne	32·98
Lyndoch	20·96
Kubusie	20 69
Blaney	r.n.c.
Kei Road	31·90
Evelyn Valley	59·88
Berlin	23·09
Isidenge	42·86
Perie Forest	34·62
Quacu Forest	35·78
Kologha	35·42
Fort Jackson	22·53
Komgha	27·46
Prospect Farm (Div. Komgha)	30·58
East London, West	23·05
Do. East	28·67
Fountain Head	24·14
Fort Cunynghame	32·71
Fort Fordyce	23·15
Exwell Park, Waku	23·59
Melrose	19·13
Sunnyside	20·68
Chiselhurst	26·98
Sterkspruit	27·89

X. SOUTH-EAST—*continued.*	INCHES.
Scott's Bottom	17·48
Dontsah	87·59
Wolfridge	36·11
Cata	43·84
Forestbourne	56·62
XI. NORTH-EAST:	
Venterstad	20·38
Ellesmere	26·03
Burnley, Cyphergat	20·48
Burghersdorp	22·19
Do. (Le Roex)	r.n.c.
Molteno Station	r.n.c.
Cyphergat	25·16
Thibet Park	22·06
Sterkstroom	20·57
Do. (Station)	r.n.c.
Rocklands	18·49
Aliwal North (Gaol)	r.n.c.
Do. (Brown)	20·49
Rietfontein	22·94
Buffelsfontein	17·93
Hex's Plantation	22·50
Carnarvon Farm	23·94
Jamestown	19·14
Queenstown (Gaol)	25·03
Do. (Beswick)	r.n.c.
Dordrecht	22·24
Tylden	24·09
Snow Hill	r.n.c.
Herschel	25·78
Lady Grey	32·44
Bolotwa (Contest)	20·85
Lady Frere	22·29
Avoca (Div. Barkly East)	r.n.c.
Keilands	23·95
Barkly East	24·94
Glenlyon	39·04
Gateshead	r.n.c.
Lyndene	20·84
Mooifontein	20·54
Poplar Grove	21·76
Biesjesfontein	r.n.c.
Whittlesea	19·68
Blikana	35·11
Doornkop	r.n.c.
Halseton	r.n.c.
XII. KAFFRARIA:	
Slaate, Xalanga	r.n.c.
Ida, Xalanga	r.n.c.
Cala, Xalanga	r.n.c.
Cofimvaba	r.n.c.
Nqamakwe	29·85
Main	28·95
Engcobo	34·81
Butterworth	28·95
Kentani	21·31
Maclear	r.n.c.
Idutywa	20·17
Willowvale	54·44
Mount Fletcher	29·69
Elliotdale	22·73
Mqanduli	31.24
Matatiele	r.n.c.
Umtata	28·51
Qumbu	r.n.c.
Kokstad	21·78
Port St. John's	r.n.c.
Umzimkulu	22·54
Woodcliff	r.n.c.
Tabankulu	27·68
Kilrush	37·80
Somerville (Div. Tsolo)	31·60
Tsomo	21·50
Seteba	27·66
Flagstaff	39·28
Quebe	r.n.c.
Insikeni	r.n.c.
Bazeya	r.n.c.
XIII. BASUTOLAND:	
Mafeteng	r.n.c.
Mohalie's Hoek	27·22
Qacha's Nek	28·74
Moyeni Quthing	42·81
Teyateyaneng	37·00
Leribe	r.n.c.
Butha Buthe	r.n.c.
Maseru	29·46
XIV. ORANGE RIVER COLONY:	
Bethulie	20·73
Kroonstad	21·58
Fauresmith	r.n.c.
XV. NATAL:	
Durban, Observatory	55·54
XVI. THE TRANSVAAL:	
Johannesburg (Park)	r.n.c.
Do. (Cemetery)	r.n.c.
XVII. BECHUANALAND:	
Vryburg	27·01
Taungs	20·21
XVIII. RHODESIA:	
Salisbury	40·92
Hope Fountain	38·09
Geelong	28·25
Chishawasha	r.n.c.
Figtree Siding	r.n.c.

THE

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EDITORIAL NOTES.

Through keeping an eye on American doings *re* Mohair we shall probably learn a few new points in this industry.

A correspondent to an American contemporary gives some interesting experiences for the benefit of those engaged in breeding fine-goats. He properly remarks that, as the chief value of the goat fleeced is the fleece, every care should be taken to keep the flock pure. In narrating a visit to a farm for the purpose of buying pure-bred bucks, he says that in the field several hundred pure-bred goats were feeding, all direct descendants from Angoras. But there were several black kids in the flock. The flockmaster explained that four black [illegible]k nannies were turned in with his flock at the breeding season in or[illegible] [illegible]ght have kids the next season. They butted and [illegible] [illegible]oras so much that a number of the does marked their [illegible] [illegible]ing the same season a number of skunks (a small burrowing animal that defends itself from its natural enemies by the emission of an extremely offensive odour) got into the enclosure and made a nest under the barn. The goats followed the skunks around, seeming to regard them as something queer. Next spring about a dozen kids in the flock were marked like skunks. The following year 200 fine all-white does were let out to a rancher who had 200 to 300 black hogs, resulting in there being among the flock ultimately about 20 black kids with coarse hog hair. A goat is the most likely of all domestic animals to mark its offspring by what it sees. Breeders of Angora goats who wish to breed white goats with fine, silky hair should endeavour to avoid hogs, dogs or wild animals running with their goats. Even a small black dog will make does mark their kids. We actually have the authority of sacred history, for it is recorded in the Bible that Jacob caused the offspring of a whole flock to be ring-streaked and speckled by the display on his veld of spotted and striped sticks. Horse-breeders also should be careful, for a case came under observation where a mare, which was butted and scared by an Angora buck, gave birth to a colt a few months later which had a coat of long, fleecy hair like that of a goat, and white as snow. Unfortunately, a lion came along and killed the colt when it was about six months old, and so a fortune was lost to some enterprising showman. These smart Americans are on the right track, and their experience is worth watching. Especially let us note that they are breeding fine-fleeced goats because it is the fine, silky hair that commands the market.

We know an accomplished sheep-breeder, whose flocks are of the best, who has printed a sale catalogue showing the pedigree breeding of each ram and ewe. As we can recommend this stud stock, we shall have pleasure in forwarding the name and address of the breeder on application.

Mr. Lounsbury, Government Entomologist, has prepared a very useful pamphlet on the Cyanide Gas Remedy for Scale Insects, which embodies a full description of the equipment necessary for the treatment of scale-infested trees with hydrocyanic acid gas and explicit instructions for its employment. The pamphlet will be supplied free on application.

We are favoured with an interesting letter from a Uitenhage correspondent, who informs us he recently received six fine thoroughbred Toggenburg milch goats which a friend and he imported direct from the Toggenburg Valley, Switzerland. The Toggenburgs are in the very front rank of deep milkers of all the fine goats that are native to Switzerland, a position which, to a certain extent, they share with the Saanen (also called Appenzell) goats, which are, we believe, not quite unknown in this country. In England the Toggenburgs are preferred as the best milch goats, and large numbers are now being kept there for the production of rich and particularly wholesome milk. That these goats are excellent milkers is apparent from the figures taken from a lecture by the President of the British Goat Society, showing that a Toggenburg goat yielded a fraction less than a gallon, or about 5½ bottles, a day. When it is taken into consideration that a goat can be kept on nearly anything as long as sweet and clean food and surroundings prevail, this is a product not to be despised. We think that if the advantages which the breeding of these goats offer were more widely known there would soon be introduced, far and wide, a different stamp of animal to the ordinary boer-bokken that bosses things now.

Did anybody ever hear of congenital hairballs? We have often felt a humble inclination to kow-tow to American intelligence in all things rural, and we would never expect anything ridiculous from the pen of an American V.S. However, a gentleman with those coveted letters affixed to his name writes in the *American Veterinary Review* of January last about the killing of a calf and the finding of fourteen balls of hair in the dead animal's stomach, whereupon the V S. prances lightly in and sagely pronounces that, "taking the age of the calf (four weeks) the number of balls, and the fact that it was near no other cattle into consideration, the question is, how did they get there?—my opinion is that they are congenital. If not congenital, how did they get there? I would be pleased to hear the opinion of any members of the profession on this case."

Many of our readers may not have heard all about hairballs, and, therefore, for their sakes and for the enlightenment of our American friend we refer to a veterinary article in the *Journal* ten years ago, showing that hairballs are contained in the stomachs of all ruminating animals, but are most common in the stomachs of calves and kids. Nature has arranged that all young ruminants should live on a purely animal fluid for the first month or two of their existence, and, consequently, has made no arrangement for the preparation and digestion of solid food during that period. The first three stomachs of calves, lambs and kids are not fully developed and fit for performing the functions of maceration and rumination of solid food until some time after birth. During that period it is intended that the young animal should live on its mother's milk alone, and if it is supplied with a sufficient quantity of that nourishing fluid, it will rest perfectly happy and contented, sleeping away the most of its time. But should the calf or kid get either too much milk, and suffer from indigestion or acidity of the stomach, or too little milk, and suffer from hunger, it will begin to pick up dirt and hair in the kraal. These solid substances will pass into the first stomach, and remain there, and be constantly subjected to the movement of the stomach, which will roll them round and round—the mucus secretion of the stomach acting like a cement to glue the particles together—hence the tendency to the formation of hairballs in calves or kids which are kept in the kraal for a considerable time after birth.

We are informed by Mr. C. F. Juritz, Government Analyst, that a small sample of latex, derived from the Umtombe tree growing abundantly in the coast regions of the Native Territory, was received by him some time ago from the Conservator of Forests at Umtata. The specific gravity of the liquid was found to be 1.012, but a portion had already coagulated previous to receipt in Cape Town. The still liquid part contained 19.07 per cent. of indiarubber. The season, age of the tree and method of tapping are circumstances that affect the quantity of the rubber, and it is hardly probable that these would be in combination in such a way as to cause the above percentage to represent the maximum quantity obtainable. The juices of plants which are of economic importance as sources of rubber often contain as little as 10 per cent. of this material and rarely more than 30 per cent., so that the above result seems very encouraging and justifies further investigation.

Probably some of the careful readers of Mr. Willcocks' report on *Irrigation for South Africa,* which we are publishing in the *Journal,* would notice that he attributes a great deal of the diseases from which stock suffer to the filthy and polluted water remaining in shallow dams that are neither supplied by springs or windmills, becoming actually putrid before they disappear altogether. He points out that in all the advanced farms to-day stock are watered from tanks fed by subsoil water raised by windmills; that these windmills might, wherever there are no permanent springs, with advantage be made compulsory, and he suggests that no farmer should have the right to water his stock at filthy pools, which possibly cause his cattle to contract disease. And that it might be possible to legislate for a reservoir to be constructed, fenced round, and protected from entry by stock. The Agricultural Department, especially the veterinary portion of it, rejoice to have the support of such an acknowledged authority as Mr. Willcocks on the advantages of uncontaminated water for stock. There is no doubt that internal animal parasitic diseases are largely increased and spread through the medium of surface water. The Chief Veterinary Surgeon has frequently referred to this subject in his reports and special articles, and he has directed attention to the advantages of providing well or spring water for stock, utilizing surface water for irrigation only. The full text of his views and instructions on this important matter were published in Vol. xiv. No. 2 of the *Agricultural Journal*, and have since been published in pamphlet form, price sixpence.

For the purposes of irrigation it is absolutely necessary to rid the soil of salt wherever it exists. So much of the country covered by Mr. Willcocks' report is composed of black soil, and he has said so little about utilizing it in the only possible way, that is by underdraining, that it seems most appropriate to republish from the *Agricultural Journal* of 15th April, 1897, Prof. MacOwan's masterly treatise on the subject. We do so with confidence, because we are sure numbers of thoughtful and progressive farmers and others are taking this thing seriously to heart, and when some day they put their views into practical operation, founded perhaps on the excellent advice of Mr. Willcocks, it will be useful to have by them this article on brak drainage written from the point of view of an eminent authority who through living in the country and in close touch with the land itself is the more capable of affording guidance in the matter.

"Oh! wad some power the giftie gie us to see ourselves as ithers see us." The *Victoria West Messenger* says that the Agricultural Department is altogether out of touch with the farming community; and that it contents itself chiefly with selecting highly useless extracts from English agricultural papers and stringing them together in its journal. The Editor of the *Zuid Western*, at Oudtshoorn, writes to us, by a singular coincidence, at the same time, and referring to "your much valued journal," says that he makes a point of drawing attention to it and republishing some of its articles, and concludes by proffering those kindly offices that one Editor can so often render to another. From all parts of the country we have received commendatory letters, and new subscriptions have been very numerous during the past four or five months. We would take no notice of the remarks made by the Victoria West newspaper were it not for the story of the Three Black Crows. It is the duty of everybody to contend against error, and as this Victoria West fairy might be wafted far afield on gossip's airy wing and thus obtain wider credence than if confined to the readers of the newspaper itself, we think it is due to the public, for whom the Department works, that the lie be now contradicted.

QUERIES AND REPLIES.

Dishorning Goats and Merino Rams.

Will you be so good as to let me know, through the medium of the *Agricultural Journal*, whether the method of dishorning calves discussed in Vol. xviii. No. 5 of the *Journal* is applicable to goats and merino rams ?

Further, I should like to know whether, by carefully selecting rams and ewes of the greatest age obtainable, and using these for breeding purposes, it is possible to increase the age of sheep ?

And lastly, at what age does a sheep give the greatest quantity and best quality of wool ?

The method recommended for the dishorning of calves in Vol. xviii. No. 5 of the *Agricultural Journal* would be equally successful in the case of sheep and goat rams, but it should be applied early, before the animals are over one week old.

With respect to the cultivation of a breed of long-lived sheep, by selecting rams and ewes of the greatest age, there can be little doubt that if you select your breeding animals from the progeny of vigorous stock which live and breed up to a good old age, you will be able gradually to increase the average age of your flocks. It is, however, essential to success that the food supply and general surroundings should be favourable to the rearing of such stock, and of maintaining them in good health and vigorous condition, without which these selections alone will fail. I would not recommend, however, that the aged animals alone be used for breeding purposes but the most vigorous of their progeny. I do not think that it is profitable to keep any animal, whose value depends upon its carcase or its fleece, or of both, beyond the age of full profit. In like manner, unless in very exceptional circumstances, I would not recommend that an animal be kept for breeding purposes after it has begun to manifest indications of decline in vigour and constitution.

With respect to the last question—well-bred sheep generally give the finest quality of wool before arriving at maturity, the greatest quantity at maturity and so long after as their character and constitution remain unimpaired.

D. HUTCHEON.

Feeding Stock on Basic Slag.

Treurfontein, E.G.

There is a deficiency of phosphates in the soil here on the Zuurberg, and I am desirous of giving my stock some of it in their salt. How would it do to give it in the form of Thomas' Slag? If you approve of doing so, what quantity should be given per head of horses, cattle and sheep?

A. H. KING.

We cannot advise you to use basic slag in the way suggested. As you will see from a perusal of the article on the above fertilizer in the *Agricultural Journal* of the 11th October, 1900, the constituents of the manure are highly metallic, and iron abounds in such a large proportion that it would prove injurious to the animals if given them in an indiscriminate manner as a food constituent. Even with the greatest care it is doubtful whether the slag could be beneficially used in this way.

EDITOR.

AGRICULTURE.

Report on Irrigation in South Africa.

BY MR. W. WILLCOCKS, C.M.G., M.I.C.E.

(*Continued from page 351.*)

Wheat and Indian corn are the principal crops, and there are large flour mills on the Caledon and its tributaries, which can be worked for nine months per annum. Mr. Newman has constructed a large reservoir by means of a masonry and earthen dam on the Leeuw River between Ladybrand and Thaba 'Nchu, and works a very important corn mill with the water power developed. Just below the mills there are large areas of the land eminently suited for perennial irrigation on which the water escaping from the mills might, with great advantage, be utilised, but the proprietors have never used it. I was told that the proprietors were preparing to make canals and utilise the water when the war broke out.

The Caledon River, which drains the whole of this tract and a large area in Basutoland, has a bed width of some 200 feet and a depth of 30 feet in flood near Wepener. The flood discharge may rise to 30,000 cubic feet per second, while the low supply falls to some 10 or 20 feet per second. The river itself has a gentle slope for South Africa streams; and runs in an earthen channel down the middle of a grass-clad valley. There are scarcely any important dykes of rock traversing the stream between Ficksburg and Wepener, with the exception of the well-known Johannesburg Ford. There are, however, minor dykes and bars which would be very useful for weirs.

The land on both sides of the Caledon River is first-class agricultural land, which might be very considerably improved in value by the construction of impounding weirs across the river at a mean distance of some seven miles from each other, and by the taking out of high level canals from above regulating weirs. The impounding weirs should be constructed of stone pitching with the largest possible blocks on the downstream side, ordinarily in the middle, with small boulders, pebbles, and fine pitching on the upstream side. The whole should be enclosed in strong wire netting, with a central core of asphalte masonry some four feet wide. Each weir should be provided with three undersluices of cast iron. Each sluice would be ten feet high and six feet wide. The openings would be regulated with screw gates. Where good dykes were met with and the bluffs sufficiently high, masonry weirs 30 feet in height would replace the weirs of stone pitching. The silt of the floods would soon staunch the weirs. The judicious working of the undersluices in the floods during their muddy stage would ensure the channel of the river against silting up; and it would thus happen that the weirs would convert the rivers in times of low supply into a series of reservoirs of considerable capacity. Each weir might be counted to store 60,000,000 cubic feet on the average, capable of ensuring the perennial irrigation in the well-watered valley of some 600 acres. Each weir would cost, on the average, about £5,000. Forty such weirs would cost £200,000, and ensure the perennial irrigation of 24,000 acres. The stone dykes would naturally be utilised for masonry weirs and canal heads. In their absence, any suitable rocky headland or bluff (of which there are many) might be utilised as the site of a regulating weir. The canals would take out with their beds about twenty feet above the river bed, and would be made capable of irrigating some 100,000 acres with the aid of the floods brought down from the Drakensberg. Of this area one-fourth would be ensured in nine years out of ten. It would be possible to put some 50,000 acres under lucerne; and 12,000 acres, or the whole 24,000 acres if necessary, under beetroot, for which soil, climate and seasons are most favourable. It might be thus possible to introduce an important sugar industry into the country. Such developments must be left to time, but the provision of all this perennial irrigation in the heart of one of the healthiest and best districts of South Africa should not be lost sight of when the question of irrigation is considered.

The banks of the Caledon in the vicinity of the weirs would be studded with willow and poplar cuttings, which would be gradually extended along the whole length of the river. The whole of Basutoland, and the Caledon Valley in particular, may be looked upon as the home of the poplar and willow.

The impounding and regulating weirs would all provide power, which could be utilised for corn and sugar mills.

Certain of the creeks draining into the Caledon River could be converted into reservoirs by the construction of rock and earth dams of 40 to 50 feet in height; but, as far as I was able to judge from what I saw, I considered the bed of the Caledon River, fed as it was from the highest reaches of the Drakensberg, the best reservoir site in the whole conquered territory.

THE NORTH EASTERN HALF OF THE ORANGE RIVER COLONY.

This section of the Orange River Colony lies to the east of a line drawn from Klerksdorp to Aliwal North. The height varies from 4,500 to 5,000 feet above the sea-level, and the mean annual rainfall from 22 inches in the extreme west to 28 inches in the extreme East. The country may be described as undulating plains of grass with a few hills interspersed in places. In South Africa every hill is a mountain, but these are generally hills. The lands are drained by the Klip, Wilge, Rhenoster and Valsch Rivers. The whole of this country is excellent pasture land, and covered with veld grass. The rainfall is deficient in August, September and October, but plentiful in December, January, February and March. Indian corn can be grown everywhere with rain. Wheat can also be grown in the extreme east in ordinary years. The rivers may be described as deep trenches running from east to west, with a mean slope of about five feet per mile, and a mean depth of some fifty feet below the general level of the valley traversed by them. In the level reaches the slope may be taken as about 2½ feet per mile, and the remainder of the fall is at the rapids or the stone dykes, which are very numerous on all the streams. As the streams are all torrents in floods, which have no long duration, the dykes are in great part sandstone. The short duration of the floods has enabled the sandstone dykes to hold their own. On the Orange, Vaal and Caledon Rivers the sandstone has everywhere been eaten away, and only the hardest dolerite or granite has been able to resist the action of the water and remain as dykes. The floods on these rivers are severe, and attain a maximum of four cubic feet per second per square mile in extensive catchment basins. The minimum discharge is practically zero.

In this country perennial irrigation could ensure as good crops as in the conquered territory, but at a greater expenditure of water. Except in the extreme east, where the conditions are similar to those on the Caledon, I should say that 150,000 cubic feet of stored water should suffice for the perennial irrigation of an acre of land. Each square mile of country might be counted on for 4,000,000 cubic feet of water in a year of drought, or for 25 acres of perennial irrigation. In ordinary years three and four times this area might be depended on, and canals should be made, capable of carrying this extra water.

The value of perennially irrigated land to land depending on rainfall may be taken as £1 to one shilling in this district, and also in the high veld of the Transvaal, the conquered territory, and in Basutoland. In the south-western half of the Orange River Colony it may be taken as £1 to sixpence. In the eastern Karroo as £1 to threepence, and in the western Karroo as £1 to one penny.

In the north-eastern half of the Orange River Colony the good veld may be taken as £1 per acre, and the perennially irrigated land as £20 per acre. Of course it is understood that no reasoning man would think of perennially irrigating any but the best land in the country.

Here, as everywhere else in South Africa, water must be stored for irrigation. In all the rivers and creeks in this section I should store water in the manner proposed for the Caledon River Valley. Storage will be far simpler than on the Caledon River as the numerous stone dykes will provide excellent foundations. As the valley rivers are considerably steeper than the valley of the Caledon River it will be necessary to construct the weirs 25 feet high instead of 20. This, however, will entail no difficulty as the foundations will be everywhere on rock. The conversion of all the rivers into perennial streams by this method will provide ample water for the agricultural requirements of this tract for many generations, especially when it is remembered that Indian corn can be grown without any irrigation at all.

We have at Kroonstad on the Valsch River an excellent example of what may be expected from the construction of even small weirs on these rivers. The Kroonstad Ford is located on a very solid sandstone dyke which crosses the river. There must be a drop of some 20 feet at the dyke itself. On the crest of the dyke is built a masonry wall some five feet high and six feet wide, which holds up the water and provides a reservoir in the river bed of no mean proportions. The water supply of Kroonstad is pumped up from this reservoir, which makes no attempt to silt up, though the Valsch River carries much silt in flood. As remarked in the description of Mr. Southey's farm in the Eastern Province of Cape Colony, there is no tendency for silt to deposit up-stream of weirs when the velocity is considerable. The Paricha weir on the Betwa River is a example of such work on a swift stream. The weir is thirty feet high and does not cause the river to silt up.

THE SOUTH WESTERN HALF OF THE ORANGE RIVER COLONY.

This section of the Orange River Colony lies to the West of a line drawn from Klerksdorp to Aliwal North. The height varies from 4,000 to 4,500 feet above sea-level, and the mean annual rainfall from 22 inches in the extreme east to 18 inches in the extreme west. It must always be remembered in connection with these varying figures for rainfall, that the better the rainfall the less is the comparative difference between maximum and minimum rainfall, while the less the rainfall the greater is this comparative difference. It is for this reason that years of drought are very severe when the rainfall is scanty. The mean rainfall of Kimberley may be taken as 18 inches, but the minimum is 12 inches and the maximum 30 inches.

The country may be described as very slightly undulating plains covered with grass and dotted about with hills in the northern two-thirds and broken-up hilly ground in the southern third.

The pan formation is quite a feature of the northern part of this country. The lower reaches of the Zand and Vet Rivers, and the Modder and Riet Rivers, on their way to join the Vaal, traverse these undulating plains in worn-out valleys some 50 to 100 feet below the general level of the country, and in troughs which are some 30 feet deep, and from 50 to 200 feet wide. Lying, however, between the rivers, and generally unconnected with each other, are these circular pans and depressions. Here and there the pans lie in continuous depressions, but more often they are quite independent of one another. They run in size from a few hundred square yards in extent to 10 and even 20 square miles. Some are 5 or 10 feet deep, others may be a hundred feet below the level of the country. Some are not brack, others are very brack indeed. Most are impervious to water, I think. The pans all lie in the northern two-thirds of this section, where the soil is generally a red sandy loam of not very great depth overlying in many places the South African Kankar already spoken of. Outcrops of rock are frequent. The rock is sandstone or dolerite.

The southern third is, as already said, more or less broken-up hilly ground. The nearer one is to Bloemfontein the less is the country broken up, and the nearer to the Caledon and Orange Rivers the more is it broken up. The rivers and creeks are traversed everywhere by dykes of stone, and sites for reservoir dams are indeed numerous.

In the whole of this country I should say that 200,000 cubic feet of stored water should suffice for the perennial irrigation of one acre of land. Each square mile of country might be counted on for 2,000,000 cubic feet of water in a year of drought, or for ten acres of perennial irrigation. In ordinary years twice this area might be safely depended on, and canals should be constructed accordingly.

Where there are no pans, the rivers and creeks should be utilised for irrigation as already stated in the remarks on the north-eastern section of the Colony. There should, however, be this difference: The dams now should be made of masonry, provided with one or

It by no means follows that wherever the above-named salts exist the soil is badly suited for culture. It is the excess, over and above what the ordinary plant-growth can endure without deterioration, that causes barrenness and renders land useless. In the elaborate analytical tables of Hilgard, many combinations of brak salts are specified, and several of typical character are here detailed.

No. 1.

Sodium chloride	4·13
Sodium sulphate	70·61
Sodium carbonate	14·82
Potassium chloride	4·72
Magnesium carbonate	1·20
Calcium sulphate	·08
Silica	·55

The above combination of brak-salts formed 21·15 per cent. of the surface soil, that is to say, over one-fifth of the weight of the soil was saline matter.

No. 2.

Sodium chloride	6·79
Sodium sulphate	75·98
Sodium carbonate	14·50
Potassium carbonate	2·92

The soil in this case contained 14·7 per cent. of salts.

No. 3.

Sodium chloride	13·06
Sodium sulphate	22·92
Sodium carbonate...	04·01
Sodium phosphate	traces.

Here the percentage in the surface soil was barely 1·02.

No. 4.

Sodium chloride	27·0
Sodium sulphate	01·5
Potassium sulphate	10·5
Calcium phosphate	·61

Of this combination the soil contained 1·68 per cent.

It will be asked, From what source does this often larger proportion of salts arise? Undoubtedly it is derived from the water contained in the deeper portions of the soil, and has been dissolved out from the weathered and comminuted rock detritus of which that soil consists. Yet such water, when reached by digging, may be scarcely perceptibly saline, and the same may be said of the soil itself, a few inches below the surface. The efflorescence, then, must be produced by slow and continual accumulation, in the absence of any counteracting cause operating for its removal. The column of soil, reckoning from the water-level to the surface, acts precisely like a lamp-wick delivering oil from the reservoir to the higher level of the flame. By capillary attraction it draws np the moisture to the surface, and delivers it there for its small percentage of saline constituents to be crystallized out by evaporation. And as this process is continuous so long as there is rain, one can understand how soils containing no more than 1·68 and 1·02 per cent. of salts readily accumulate a white coating of brak upon their surface. The delivery from below, though small, never ceases during dry weather, and practically nothing is carried away.

Let us now consider what happens when the periodic African rains come upon such land. It might be supposed that all the effloresced salt delivered upon the surface since the last rainfall would be washed away, and escape into the superficial drainage of the district, and so on into the river system of the country. This is far from being the case. The first effect of rain is to dissolve the salt rime lying upon the surface in a few minutes, forming a strong solution. The earth, which has carried it so long, is dry and porous, and instantly absorbs this solution, long before the precipitation has been sufficiently copious to cause any perceptible water-run along the natural slope of the land. And thus it comes about that even a rainfall of many hours duration is powerless to decrease perceptibly the content of brak salts in the superficial layers. It runs over the surface, and much is absorbed, for the capillarity is for the time reversed, and is acting downwards. But the salts have, by their absorption, escaped from the superficial scour, and are being carried downwards as far as the moisture penetrates. As soon as the dry cycle returns and the land becomes desiccated, they rise once more, and are again delivered upon the surface, and this oscillation of the brak content of the soil goes on, inevitably following the alternations of wet and dry times.

What is true of the impotence of a periodic rainfall to clear the ground of salts is equally true of efforts to subdue the brakness of a small extent of land by means of irrigation of the usual kind, that is, a simple flooding of the surface. The salts cannot be dissolved out and washed away, simply because the porous stratum on which they lie withdraws them at the moment of solution, and holds them over till the next drying out of the surface. We shall see hereafter that it is possible to apply a remedy, albeit a costly one, to amend this disastrous order of things, which has been the despair of the agriculturist in all countries of short periodic rainfall. And to this remedy we shall be naturally led by a consideration of the local causes which bring about the apparently capricious alternation of brak and zoet-land, in patches extending sometimes over many square miles and as often over only a few roods.

But little observation and reasoning from what is observed will be needed to connect the phenomena of the occurrence of brak land here and there with the peculiar nature of the deep-seated water supply. Very large areas of the country are traversed by intrusive igneous dykes, resembling impervious subterranean walls. These mostly run east and west, therefore across the general slope of the country downward to the sea. They are the chief factors in determining the collection and retention of subterranean water. Given a large catchment area, bounded south by one of these dykes running in practically a wide curve for miles without a break; given, too, a retentive substratum—the water gathered upon it must accumulate and rise until it reaches some crevice in the dyke-wall. There it will escape as a spring. But if such crevice lie low under ground, the water will simply pass on uselessly to the next lower catchment area. Suppose, however, the impounded water is never in such large volume as to make its way to an outlet, but is just sufficient to supply continuously the loss occasioned by the capillary upcreep towards the surface and evaporation there. In that case, we have all the conditions necessary for the production of a brak patch of land. However small the percentage of salts in the impounded water, every gallon of it fetched up to the surface and evaporated must leave behind its quota of brak salt. As the cause is continuous, the accumulation of minute additions is continuous too, and soon totals up to a degree injurious to vegetation of the ordinary kind. Such probably is the *rationale* of the production of stretches of brak land of fairly large extent. On the smaller scale, a basin of retentive clay, or of ferruginous or calcareous hard-pan, acting as an impermeable sub-layer, may similarly detain irrigation or rain water, and slowly transmit it upwards to be evaporated away. As before, the insolated hardened surface receives every particle of saline water, and an efflorescent deposit of salts results, bounded in outline by the concealed extent of the impervious water-basin below.

Clearly the brak-phenomena will not in every case accompany the hard-pan layer. Suppose the stratum to have an even upper surface and an uniform dip; then the deep-seated water of percolation is not impounded, and will slip along by gravity down the common slope to which the layer is tilted. But wherever a depression occurs —a pucker, so to say, in the sheet of hard-pan—there will water be detained permanently, its saline content will be carried to the surface, and a brak patch must necessarily follow. Moreover the existence of such uneven impervious layers with numerous irregular depressions on their upper side, enables us to understand that puzzling and discouraging phenomenon in the culture of mixed brak and zoet veld, viz, that the free use of irrigation water thereon is apt to result in the enlargement of the brak patches, and even the conversion of the whole area into uniformly brak land. In California this result is very common, and the phrase is that "irrigation causes a general rise of the alkali." What it means is just this: the water flooded on, and percolating downward to the hard pan, is greater than can be got rid of at once; it therefore forms one uniform subterranean water-stratum over the whole length and breadth where previously there had been only water hollows here and there. From this water supply, for a time co-extensive with the surface of the irrigated soil, the inevitable capillarity carries up the moisture, and with it the salts to supply an equally extensive efflorescence as the surface dries out. If the attempt to irrigate be abandoned, things resume their former balance—the brak patches dwindle down to their former limits, and the interspaces, after a year or two, become zoet once more.

The formation of calcareous or ferruginous hard-pan is a marked specialty in all countries belonging to the more or less arid region of limited and periodic rainfall. The whole quantity precipitated does not penetrate to anything like the depth averaged in humid climates, and it depends mainly upon the open texture of the soil and the geologic dip of the adjacent strata whether it shall have the power to leach away downward in a natural drainage. "Whenever these conditions are not thus favourable, the water penetrates, relatively speaking, to an insignificant depth, and ere long reascends to the surface layer, there to be dissipated by evaporation. The lime dissolved in its descent therefore accumulates within a very limited thickness of soil, and chiefly at the lowest point reached by the moisture. Concurrently, the finely diffusible clay brought down by each rain stops at or near the same level; and both substances combine by mechanical union into a subsoil sheet of hard-pan, the cementing ingredient of which is the lime. These hard-pan sheets are more or less discontinuous, the area occupied by them being commonly rounded or oblong in shape, and *lowest in the middle*."* Their power of collecting and impounding water, that is, of water-logging the subsoil, is often plainly evidenced by the temporary formation of a pool or vley, during the rains, over spots where the basin-like depression is considerable. And for one such vley which brings its impounded water up to sight in the open, there must be hundreds which lie concealed beneath, every one of which will inevitably give up its moisture by capillarity to the surface, and deliver there every grain of the contained brak salts as a visible efflorescence.

The investigation of the conditions producing brak in regions like ours, of restricted periodic rainfall, as compared with those of countries with humid climate and greater precipitation, shows with great clearness that the main difficulty is presented by the *back-leaching*—if it may be so termed—of the limited water supply, that is, its return to the surface under the powerful influence of capillarity kept going by a heated, sun-smitten surface. Whatever perpetuates the *downward* creeping of the rainfall-water, and stops its return *upward*, cures brakness radically.

Towards this end there is one complete remedy, and only one—namely, a system of complete subterranean drainage.

The mischief is done by a perfectly natural force, the capillarity of the insolated soil. The remedy prescribed brings to bear another

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*Hilgard. *Alkali Lands, Irrigation and Drainage. Appendix vii. to Report of* 1886 *University of California, p.* 59.

natural force, even that of gravitation, to arrest the rise of the water, and with it the "rise of the alkali" it carries. With an adequate system of under-drains, every cubic foot of water thrown upon the land, whether by rain or irrigation, *must* gravitate downwards towards the outfall, and none will be detained except such contingent as is withdrawn by the root-hairs of plants for their vital processes of growth, is taken up into chemical combination by the mineral constituents of the soil, or is mechanically held as a moisture-film over the surface of each soil-particle.

That Cape agriculturists in a large part of the Colony should think out this matter for themselves, and acquire a conviction of the truth of these conclusions, is much to be desired. The facts and the whole chain of cause and result have been the subject of much discussion and much correspondence during the last twenty-five years, particularly at the time when the Colony in 1881 went gaily into the Van Wyk's Vley irrigation scheme, without the smallest provision being made for the systematic drainage of the area proposed to be irrigated. To every argument that could be adduced, the answer invariably was, that this being a dry, arid country for the most part, proposals of *drainage* were simply preposterous, seeing that there was no excess, but on the contrary a deficiency of water. Administrators, representatives, engineers, farmers alike accepted this supposed *reductio ad absurdum* of the voice crying in the wilderness. The logic of events has, however, enforced the inevitable nexus of cause and consequence, and demonstrated by the sad experience which is the wisdom of the unwise, that in arid lands irrigation and drainage *must* go hand in hand. Otherwise, in a few years culture all over the irrigated area is poisoned out with alkaline salts. The end foreboded came all the sooner in that the irrigation water itself was decidedly brak and contained from 26 to 45 grs. salts to the gallon. At the present moment the holders of erven laid out below the foot of Van Wyk's Vley dam have all retreated before the encroaching alkali, and the nearest cultivator using the water is three miles distant! M. Vilebouchevitch, a Russian savant, who has made the problems presented by brak lands his study of predilection, refers to our disastrous irrigation fiasco with an angry pity. I take leave to paraphrase his words: "It is heart-breaking to see over again and always the same blunder. There are people, at the Cape, who are attacking a problem equally in evidence in France, California, and even in Indo-China, without the least knowledge of what has been done in these different countries in respect of this very matter, which is ever in evidence. What a loss of time, and what a loss of money!"—*L'Etude et l'Utilization des Terrains Salants*, 1898.

Let it be granted that an adequate system of under-drainage, whereby the remedial force of gravitation should be pitted against the destructive force of capillarity, is costly: perhaps as costly as the original work of impounding the coveted water supply. The question recurs in a twofold form. One may ask whether it is advisable, having spent so much money on what proves itself to be an arrangement for the spread of brak, to spend as much more in *now* doing what should have been done at first as an integral and necessary part of the scheme. No irrigation work taken in hand by men who have a knowledge of agriculture as well as of hydraulic engineering can be complete without the drainage system which is to carry downward and away the water they propose to throw upon the land. And unquestionably, the application of such a system, and its intelligent working for the next ten years, would undo the lamentable results of the one-sided scheme in operation since 1885. It would simply leach out the accumulated alkaline salts, and carry them off to the drainage outfall, and, since the bottom water is held in check by the same drains, there could be no subsequent rise of the alkali. The average salt-content of the soil thus leached out would exactly resemble what it was before the inception of the scheme, that is, it would be far within the limit of endurance capable by cereal and root crops, and would be governed as to rise and fall in percentage solely by the purity of the water in the Vley itself, not by continual accumulations every time the plot received irrigation.

The other question suggested seems to be the imperious necessity of the moment. It is whether the prospective schemes of irrigation now under consideration, if not on the eve of inception, have so far profited by the dear-bought experience of the Carnarvon district as to look beyond the engineering feat of impounding the water and throwing it on the land, to the equally important agricultural necessity of getting it off the land by under-drainage. To use M. Vilebouchevitch's quoted phrase, it would be heart-breaking, with Van Wyk's Vley in evidence, to have the old ignorant assurance come forward to tell us that an arid country needs no drainage. For as sure as units perpetually added reach up into millions, so the perpetual increments of a fractional portion of salts to the soil must, if no means of removal are provided, result in brakness and sterility. And that is what irrigation without drainage, natural or artificial, must inevitably lead.

It not unfrequently occurs that, by a happy chance, the arrangement of the strata underlying a stretch of arable land requiring irrigation is such as to lead to a sort of automatic drainage. Places could be pointed out in the Karroo where fertile soil is traversed deep down by a continuous stratum of water-worn pebbles, resting upon the bed-rock of the district, and terminating in the channel of a periodically running spruit. The pebbles mark the line where water once has flowed;—now they form the desired drainage for the superincumbent alluvium. In such places, no amount of irrigation thrown upon the land interferes with its character, or produces the least efflorescence of alkali. They are mute witnesses to the truth that the exit of irrigation-water below is as important as its entrance above. Other localities, too, could be named where only a very sluggish off-flow results from the subterranean trend of the bed-rock on which the arable deposits lie; and here, according to the season and amount of rainfall, the condition of the soil perpetually oscillates between a fresh sweetness and more or less of brak. It is under such circumstances, to say nothing of those where brakness must be accepted as beyond the true remedy because of its costliness, that certain palliatives are capable of application. At the same time, it must be remembered that their effect is only temporary, and they do not stop the evil by removing the cause.

The first of these is purely a chemical process, viz., the application of heavy top-dressings of *gypsum*. This substance is calcium sulphate, and in presence of the most pernicious of brak salts, sodium carbonate or black brak, it upsets that salt entirely. The two exchange acid elements and

Instead of Sodium-carbonate and Calcium-sulphate we have
Calcium-carbonate and Sodium-sulphate.

Now, land poisoned with black brak and utterly sterile thereby, may bear a very tolerable crop when all that alkaline salt has been converted into the comparatively innocuous sulphate. As to the calcium carbonate or chalk, it certainly does no harm whatever, and may be of great use in helping to flocculate and open up a clayey soil. And the good effect of the gypsum in thus transmuting the black brak will continue just so long as there is any free gypsum left in the tilth. But when it is all exhausted, the black brak will once more begin accumulating, and the work is to do over again. Moreover, the process cannot go on indefinitely, for, at the best, the resulting sodium sulphate is undesirable, and will soon accumulate detrimentally.

Secondly, the surface evaporation of under-water, raised by capillarity from below, is very largely diminished by breaking up the topmost four inches of the tilth into a pulverulent stratum, and by frequent working with suitable implements, keeping it in that powdery condition. Such a cover acts precisely like what gardeners term a "mulch." Capillarity works as usual till the mulch-stratum is reached, and then it practically stops. It is easy to see that by this method a useful superficial cropping layer is obtained, on which shallow rooted plants can with little difficulty be raised. The unfortunate erf-holders at Van Wyk's Vley did something of the sort when they grew annual garden crops on the raised angle of ridges made as high above the common level as the line of repose of the thrown-up earth would allow. The earthing up had the effect of establishing long rows of what has here been likened to a mulch.

Following in the same line, viz., the stopping of surface evaporation, something may be done by the selection of crops which shade the soil as much as possible. When a good stand of foliage has been achieved, the major part of the evaporation arises from the moisture exhaled naturally from the leaves, and this does not contain and set free any efflorescence of brak salts. Of this sort are lucerne and white melilot or Bokhara clover, beet, mangold, spinach and some sorts of cabbage. However, the method lies within very narrow limits, and is a gardening rather than a farming experiment, for it is found that the akali is even more prejudicial to seedlings at the first stage of germination than to the more mature plant. Hence, there are places where it is hardly possible to sow. Whereas the same ground in which seeds refuse to germinate will often permit rooted stock to grow pretty fairly when transplanted into it. However, liberal treatment of a seed-bed made in such brak soil with gypsum, will, on the principles previously explained, so far decompose the poisonous sal-soda as to permit of the successful raising of seeds for planting out.

But everyone who has mastered the physical conditions which combine to produce brak land will be convinced that all these makeshifts are of no real avail, and the only and radical cure for brak land, and preventive of slow accumulation of alkali by irrigation, is an adequate system of *Under-draining*.

P.M.O.

HORTICULTURE.

Practical Orchard Work at the Cape.

(Continued from page 371.)

23. Everybody thinks he can plant a tree, just as everyone believes he can poke a fire, make a speech, or drive a buggy—till he has tried. It is easy to plant a tree wrong and make an utter mess of it, but we want a more excellent way. Even supposing that your ground is well aërated by trenching, it is quite worth while to have all the holes for your graftlings dug out before you begin. You get the run of them better, you can correct the lines of setting, and the stuff thrown out in the upcast is all the better for being exposed to the sun and air. Particularly is this to be recommended when the loam you are planting in is just a little too clayey. Let us suppose you have purchased your graftlings by selection from a first-class nurseryman, and with all due care to the nature of the stocks upon which they have been worked, the pedigree sorts they represent, and the proportions of the kinds according to the fruit-business you intend to run. As soon as they arrive, have the parcels opened without an hour's delay, and heel them in properly at once. Do this even if the holes are ready and you mean to plant next morning at daylight. A score of things may

happen to postpone your work; besides, the labour is very trifling. You dig a furrow with one side specially slanting, in the lightest and most open soil that you can command, taking care that it is moist, or rather, damp without being wet, and not exposed to the sweltering sunshine. Along the slope of this you lay your trees one by one from left to right, carefully sticking in a name-label at the point where each sort runs out. When you come to the last plant in each bundle shovel the fine earth gently over the roots, a little at a time, so that it shall wriggle well in among them, and it will be no harm should the earth cover one-half or even more of the stem. Suppose the trees have come from far, you may dip the bundle in water to wet the contents thoroughly, and then proceed as before. If they have been very badly used in transit, and the bark at the top looks all shrivelled, you may give them a somewhat longer bath, but not much. In such case it is far better to rake the fresh earth-slope back a little and cover the young trees with a thin cool upthrow of earth. Nine times out of ten, a day and a night of such treatment will make them look as plump as ever. Nor is this at all wonderful. Every green part of a tree, not excepting the stem, while it is young and still keeps its green colour, transpires actively. Hence the temporary wilting is due to the young bark having thrown off a considerable quantity of moisture which cannot be replenished from the severed roots. The cool, moist earth round the green stems enables them to recover themselves and get back that moisture they have lost.

24. Be very careful that no mixing of the sorts occurs through the officious helpfulness of the labourers. In fact, unless the number is very large, it is best for one person only to do the heeling in, and thus secure accuracy in labelling and the avoidance of mixture. It is altogether aggravating to find an odd peach or apple breaking the symmetry of a line intended to carry fruit all of one kind. Remember also that it is no business of the nurseryman to cut back your graftlings to what he may choose to consider a standard size. In fact this is done by most nurserymen merely to save themselves a little trouble in packing, and to make what they are pleased to term a neater bale. Insist on having the trees sent you precisely as they were lifted from the ground in the nursery-bed with the digging-fork. The subsequent shaping of the tree is your work, and must be deferred until you have got it set in its place in your orchard.

25. The actual planting of the tree is about as simple as a thing can be. Yet often curious mistakes are made. It is best for two men to divide the job. A little of the upcast earth is thrown upon the bottom of the hole, and the soil is then loosened up by a chopping action of the spade. More earth is added until it is found by trial that the graftling tree will sit easily on the loose content and the collar stand a little higher than the level of the surface in which the hole has been dug. The contraction of the filling will take up that slight surplus and leave it true. The roots are then carefully

looked over, all broken ends are cut off with a sharp sloping cut facing downwards, and the fibres distributed evenly upon the cushion of soil in the hole. They must be divided fairly around the circumference of which the stem is the centre. Little by little the attendant shovels in small quantities of loose earth, and this is packed and worked in by the planter's hands, so that close contact, and above all the absence of hollows, may be ensured. At the same time the planter looks to the accurate setting of the tree, both for line and uprightness. Then both men shovel in the soil to the surface. Note that the firming of the soil immediately among and over the roots is done with the planter's hands. Neither immediately on the roots nor even on the surface soil is there any need for the ill-considered tramping and jumping on the in-throw which is so often practised. The object should be to ensure for the root-system a firm yet gentle contact with the moist aërated spongy soil. The prevalent ramming-in of the earth may be useful in setting a post, but we are dealing with a living organism from which we expect delicate rootlets to grow, and for which we desire to prepare a suitable feeding ground. Some planters fill the hole carefully up to the brim, and then gently press in the whole mass with the foot, subsequently filling in the space so gained with more soil to level up once more. Good work may be done thus, but there is no method more reasonable or more successful than the manipulation of the first additions of soil around the roots with the hands, to ensure the proper degree of closeness and firmness without losing the open sponginess of soil which is all important to preserve.

26. Then, even if rain is falling at the time, the final operation must be watering. From a gallon and a half to two gallons of water, according to the size of the hole, is to be gently and slowly watered in from the rose of a can. It will not do to slush it in from a bucket. The effect desired is to settle the particles of soil finally in their places, and establish an average of equal pressure around the root. A sudden dash of water will convert the top stratum into mud, and this will dry slowly into an impervious caked surface, whereas after watering, the soil round the little tree should be just as open and porous as before.

27. If you can choose your time, let the planting be done in cool overcast weather, without either bright sunshine or much wind. The caution given as to the vital transpiration taking place from all green parts, even the stem of young plants so long as it has not acquired its mature brown corky layer, applies here. In a few days, if the soil be not inhospitably cold, your tree will have begun to callus the cut portions of the roots with new tissue, and new white feeding fibres will spring from this layer and from the uninjured branch-roots, each sending up watery food-material into the stem. The little tree has caught on in its new home.

28. The Cape is a country where some things are killed with mistaken kindness. On no account follow the common custom of bottoming every tree-planting hole with a shovelful of manure,

under the idea that the tree is getting thereby a special mark of attention. Independent of the fact that "manure" too often means raw stable dung, fermenting fast and reeking with ammonia, there is this to be considered, that manurial ingredients can only be satisfactorily taken up by those fine root-hairs we described, when presented in a very diluted state by the help of water. And, moreover, the fermentation and decay of this organic matter gives off a large quantity of carbonic acid gas, filling up the interstices of soil and driving upwards the atmospheric air which ought to fill them. It is fortunate that gases have a wonderful power of diffusion, and dilute themselves away with great rapidity. Were it not for this, the custom of bottoming tree-pits with fermenting dung would have been dropped long ago as a sure means of asphyxiating the roots. If the orchard has been prepared properly in average fertile soil, or, if in one somewhat poorer, a little old well-rotted manure has been added during the trenching, there is not the least need for these kindnesses. As a general statement it may be said that orchard manuring is best done by top-dressing, turning the material into the upper tilth to be carried slowly by solution down to the level of the roots. As each tree is brought into place, a note of its position and name is entered in the foreman's book, something thus. Say it is peaches we are handling—"Row A, 1-10, Royal George; 11-20, Grosse Mignon," and so on. From these data taken at the moment, the chart of the orchard is compiled, so that there may be no reliance either upon a vague remembrance or upon the salesman's labels, which wind and rain will soon render illegible. In this plan every row is carefully plotted, and the individual trees have their names entered in where they stand. By preference make the plan upon a piece of the transparent tracing linen used by surveyors. It does not readily tear, as all paper will do unless mounted on calico or other tissue. Do not fold it square-wise, lest it rub through at the kinks with much use, but rather fold it exactly like a window-blind on a light wooden roller. It is not at all superfluous to make the plan out in duplicate, so that in case of accidents, fire or what not destroying the first copy, you will not be utterly at sea as to the names and whereabouts of your fruit-sorts. It may well be said that next to our habit of letting seedlings run on to fruit, neglect of this simple precaution is perhaps the chief cause of the absence of any general knowledge of fruit-sorts and the qualities which distinguish them one from another. We have to acquire such an amount of what is rather grandiloquently called "pomology," in order to hold our own against foreign growers who know fruit-sorts at sight as they know their dogs and horses. It is not a good plan to stake your young plants in the usual way with a support driven in among the roots you have so carefully established. Much mischief is often done by this ill-considered operation. Yearling trees when headed back will almost always be so inconsiderable in bulk as to afford no opposition to the wind, and this is an additional reason for beginning a plantation with them instead of with two to three year olds. In all cases where staking is absolutely necessary, as in large transplants that have already been cut back in the nursery to form leaders, it is much the best plan to put in two stakes 14 to 15 inches distance from the tree, and tie it to a crossbar fastened horizontally from one to the other. But no experienced person would choose stuff of this sort. It is the beginner who buys his trees big. Yearlings have mostly at the end of one season got such firm hold of the ground with their roots that they have no need of artificial support, and are every way preferable.

29. As soon as the row of trees is in place, the planter, in accordance with his pre-arranged plan of future proceedings, shortens back every graftling to the definite height suited to its kind. Some cut back knee high, others allow a little more height. In every case the level must be as nearly as possible the same, and the section must be made aslant, just above a bud, neither cramping it in nor leaving a peg of wood above it. If the cut slopes back too close behind the bud, leaving it as it were a projection on the upper end of the oval section, there will not be sap enough left to nourish it. Should a good inch or more project above it, that piece will assuredly dry up and die, probably bringing decay into the tissues of the stem below. It is difficult to get amateurs to see the necessity for this shortening back to a given height. It seems to be a wanton throwing away of so much good stem-growth, and they are apt to let the young trees run up like fishing-rods, unconscious of the covert derision with which the skilled gardener surveys their forest of sticks. It will presently be quite clear why yearling trees were previously recommended, and why shortening back is laid down as a necessity of the case.

30. And when this operation of cutting back is in hand, remember that you are dealing with tender young stuff, which has not yet formed a hard wood-cylinder within, or a corky bark without. On no account be tempted to use the convenient and rapid secateur. However cleverly made, with crescent-blades and a rolling pivot, the cut is never so clean and satisfactory as that of the ordinary pruning-knife fresh from the oilstone. The tender bark is invariably somewhat bruised and the cambium-layer underneath crushed. A keen cut with the knife has none of this nipping action, but leaves the bark perfect and in close contact with the underlying wood right up to the line of section. No careful grower who has examined with a lens the rough clip of the secateur, and compared it with the clean section of the knife, will ever use the former rough and ready implement upon his young plantlings while in the infant stage, whatever he may do subsequently in coarser work. And yet another caution. It seems almost absurd to add—when cutting transplants back to the determined height, take care not to pull them loose from their seat in the soft earth with a jerking cut. Yet one sees this thoughtless trick done times without number. Hold the stem firmly with the left hand, while making the sloping cut discreetly with just enough force and no more to bring the edge

through. So shall your care in planting not be stultified by thoughtlessness in the next operation.

31. We have pointed out that fruit tree culture is essentially a formative art. The trees we plant are not left to take their natural growth, but are compelled to follow the artificial conditions which long experience and observation have shown to make for the cultivator's advantage. The first of these interferences enforced upon the tree's life tends to shape it into some one of certain compact and convenient forms. In this country there is only one form of general application. The tree is worked into a more or less inverted cone, the main axis of growth being suppressed, and secondary branch-growths encouraged to spring outwards and upwards from the point of suppression or near it. Ultimately the tree presents an outline more or less completely Y-shaped, variations arising merely from the greater or less angle formed by the chief branches with the line of axis, and the amount of bearing wood allowed to develop inward and outward of the cone. The chief exception to this general plan is the orange and lemon series of fruit trees, where it is essential to their well-doing that the axis be not suppressed. But with other fruit trees, the inverted cone system should be almost universal. Just as our Cape vines are invariably pruned up *en gobelet*, to use the French vine-dresser's phrase, with a short centre stock and four or five lateral radiating arms, so that method is carried out as far as possible in the orchard. And espalier, cordon and fan-trained trees are even more uncommon than vines grown on vineyard trellising of wood or wire. No attempt will be made to detail the method of shaping trees in what are, as far as the Colony is concerned, merely fancy methods. It was not without reason, but with a wise prevision of the power of the Cape south-easter in destroying costly trellises, that the Huguenot fathers of our viticulture abandoned the *cordon* and *échalas* of their less wind-swept home, and adhered to the less picturesque but far more suitable *gobelet* form, or as we might phrase it, the cup-shaped pattern.

32. The first step in shaping has already been taken when we headed back the graftlings as soon as planted. The buds on the remaining twelve or fourteen inches of stem will speedily begin to shoot out into leafy twigs. Seeing that all the carbo-hydrate food-material of the plant is elaborated in the leaves, whence it passes down to the stem and to the points where growth is going on, this early foliage is performing the function of a stomach, and it is not advisable to be anxious to cut these twigs out directly, saving only those afterwards required. It is an error to suppose that leafing exhausts the little tree. The extension of the feeding roots is materially assisted by the existence of leafage above. But when the growth has reached some five or six inches in length, the cultivator passes every tree in review, selects as future laterals three, four or five of the shoots best placed for equal division of the space at command, and either completely suppresses all the other lower

shoots, or pinches them out to a mere two-inch spur. Practice differs on this point. Some like to make a clean stock at once; others, knowing that the bunchy leafage left helps the tree-growth, let it remain to shade the trunk, which as yet is tender and liable to sun-scald. The chosen laterals make their growth right away to the end of the season.

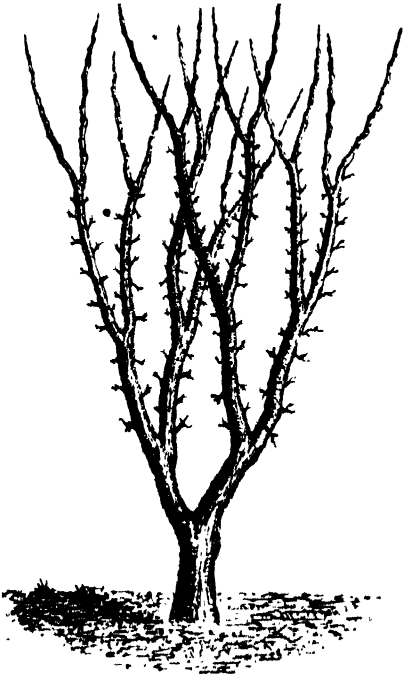
33. During the dormant season succeeding, another step towards shaping the tree is taken. Each lateral is cut back to an outside bud, leaving about a foot of its length remaining. Gardeners of experience keep in mind their knowledge of the special habit of this and that sort which they may be pruning. If the kind be one of spare and lanky growth, apt to make a thin hollow head, they will perhaps cut the laterals back to a bare six inches, and in this way secure a closer after-set of branches. A sort lavish of wood and hard to keep in bounds is left full long. This "counsel of perfection" can only be hinted at here, to show by an example how much observation and forethought go to make a good gardener. The average given, viz., one foot, will be found to cover average cases, and the reader must get his experience where every skilled man gets it, that is, by trial. Supposing that side shoots have been made on the part of the laterals left, they are to be cut back to the lowest or at the most the second bud from the base. Many, as in the case of the main stem, cut them away entirely; a practice not to be recommended.

34. The second season comes round. Each twelve-inch lateral is allowed to make two sub-laterals and no more. The others are pinched out as they appear all through the summer. In choosing the shoots for these and suppressing the rest, much more judgment is required than in the simple work of the first year. You have to consider what form will be given to the tree by the increase of this or that shoot you may elect to leave, and thus prophesy what your tree will be like ultimately. And unlike other prophets, you can force your predictions to come true. Leave all these sub-laterals of the second degree to grow their best throughout the summer following, unless they become too rampant altogether, and break away into side shoots to the weakening of their axial extension. The apricot has a precocious habit of this sort, and has to be kept in order by pinching in during the summer as may be necessary.

35. So matters proceed till the third winter pruning-season comes round. The tree has now got its Y-shaped profile pretty distinct, and the dullest observer can see it is being worked on a predeterminate plan. Do not let the tree give more than a sample of its produce, just to assure you it is the precise sort you planted it for, and that it agrees with the authoritative descriptions in Hogg's Manual and other pomological descriptive works. Thin such precocious bearing down to just enough for judgment; the fruit is rarely equal in size or flavour to that of the crops you are to get if you wait. The pruning you have to do is exactly a repetition of last year's work, but a stage higher up in the tree. You had originally

four branches. You allowed eight laterals to run, two from each of them. Now your set of eight is to be converted into sixteen by choice of the two best-placed shoots on each. Pinch out the rest as before. Cut back to about eighteen inches those you preserve. And here a little judgment must be exercised.

36. Seeing that in this third series of reserved shoots we have advanced much higher up in the cone pattern we are shaping out, it is clear that the circumference of the pruned head of the tree will give now a very much larger circle than previously. The operator must therefore take care that he does not "prune to a hollow head," that is, cut the series all to outside buds, which will shoot outwards, enlarging the cone, and give little or no provision for filling the centre. Enough must be cut to side buds, or even inner ones, to provide against an open head. All that can be done in these verbal directions is to point out that cutting to outside buds tends to enlarge the cone and thin the head; cutting to inside buds will as certainly decrease it and thicken up the head. A judicious balance between the extremes must be made, and this result will give a well-formed Y-shaped tree whose centre is sufficiently dense without crowding, and whose arms are not so extravagantly splayed outwards as to make the junction whence they spring too weak to bear the leverage exerted by the limbs and their weight of fruit.



Nor are they so much sloped as to interfere with your hand-cultivator or your barrow. Much may be learned by watching the practice of some wise old gardener, and if possible following the mental picture he has in his mind of what the tree is to be shaped up to, and observing how he makes the buds to which he cuts serve his purpose. Above all, the beginner must try for himself, after getting the principles of the art well into his mind. Undoubtedly he will make mistakes; but every mistake should be the very best lesson in *never making it again.*

37. It is scarcely necessary to add that there is nothing absolute in the number four taken as an example. Three shoots only may be allowed to start from the yearling transplant, giving next season six sub-laterals, and these six will result in twelve. Custom and fancy have much to do with the number chosen, and the only thing that can be said is, that it is better to have too few than too many.

38. The result of the three years' shaping is to give a tree, not of its own wild natural habit, but of one of the shapes best fitted to turn the whole of its available powers into fruit production. The subjoined figure gives an idea of the general type to be aimed at, and a careful study of the direction of the second and third series of shoots will show that the uniform distance apart of the branches forming the crown has been got by cutting after the manner here indicated. The subsequent yearly pruning is really little more than the maintenance of the artificial condition now reached, *plus* certain adaptations called for by the peculiar habits affected by this tree and that.

(To be continued.)

The Right Method of Trenching.

An Advice for Amateur Gardeners.

In the matter of trenching, there is, as in most cultural work, a right and a wrong way. Some labourers think they have only to upset the whole mass of soil, placing the top spit just where the bottom one was, and *vice versâ.* Now in a very deep rich alluvium, it perhaps might not matter much if this were done. But where a foot or a foot and a half of good soil overlies an unworked comparatively sterile subsoil, the result of such upsetting would be deplorable. At the cost of much labour the workman would have *buried* his fertile field, and gotten a hungry raw spread of soil in its place.

If the work is extensive, the best plan is to divide it into short sections instead of having the trenches very long. Let us take an example of 2-foot trenching of a piece of ground in a well-ordered garden.

FIG 1.

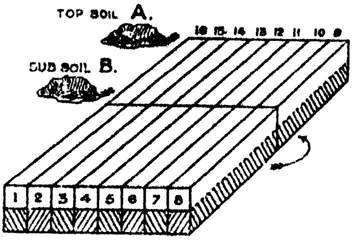


FIG 2.

SECTION OF 1 & 2

The work is begun by taking out all the topsoil of both sections 1 and 2 to a depth of 1 foot, as in fig. 2, and wheeling it away to the upper corner of sect. 16, as shown at A, fig. 1. Then the second foot of the depth of sect. 1 is similarly taken out and wheeled away to form a heap beside A, but distinct from it (B). You have now to dig up the remaining foot of sect. 2, which, mind you, *is subsoil*, and to pitch it into the hollow left in sect. 1 when you carried its foot of subsoil away over to B. Think what you have done. You have removed the subsoil of sect. 2 into the space occupied erstwhile by the subsoil of sect. 1, and in so doing have broken it up, spadeful by spadeful, into small clods, and mixed it with the healthy and essential air. It is now an open, aerated foundation for your upper tilth instead of a hard, sluggish, impervious bed, in which roots going deep down must become asphyxiated for want of air, and have at the best to *bore* their way through mortar. You will be surprised what a much larger bulk this displaced subsoil of sect. 2 will make compared with what it occupied in its old place; in fact it will go far towards filling the sect. 1 trench. As you get down in excavating sect. 2, you must keep beating back the loose side of what you are piling up in sect. 1, else it will fall in and give trouble. Some labourers wedge in a plank along the side to prevent this, but the precaution is not necessary.

Now you want a foot of topsoil to finish sect. 1. Then dig out the top-foot layer of sect. 3 and pitch it over the 2 foot deep trench which represents sect. 2 on to the loose filling of sect. 1. When finished off, sect. 1 will rise notably above the former surface of the plot; it may be 5 or 6 inches higher. That extra bulk represents the volume of good old *air* which has been mixed with the soil, and which about doubles its cultural value.

The top-foot of sect. 3 being removed, its subsoil is of course exposed. Then you proceed to dig it out and pitch it into the bottom of the still yawning sect. 2, beating it up just as you did when filling up the subsoil of No. 1. For a topsoil 1-foot-layer to finish off sect. 2, you must dig out the top-foot of sect. 4, and pitch it over the cavity representing the place where sect. 3 was a little while ago. Level it when 2 is full, so as to dress up with the surface of sect. 1. Thus you have two divisions of the work done. Go on exactly in the same way.

The result will be that the sub-foot of 2 is now the sub-foot of 1, the sub-foot of 3 has passed over to 2, the top-foot of 2 is now topping 1, and that of 3 is topping 2. No sleepy subsoil has been brought up to the surface; the best tilth, worked and manured for years, is still at the top where it should be, and the total working bed has got a new lease of usefulness and fertility by being broken up and mixed with about half its bulk of wholesome air for the roots to breathe in their slow but indispensable way.

Thus the interchange goes on. Ultimately the end of the row of sections is reached, and the work goes along the next row in the reverse direction as indicated by the arrow and the order of the figures. When the second row is coming to an end, you will have sect. 15 half full and sect. 16 quite empty. Well, fill 16 half full of the subsoil it wants from the heap B, and then the big heap A, which was originally the top-foot layer of 1 and 2, will neatly fetch up 15 and 16 to the common level.

This is the way to trench. I have known an amateur bury his good garden tilth two feet deep under a miserable hungry subsoil dug out from below. He was in despair, and inveighed against the bad advice his book had given him, recommending trenching. I told him it wasn't the book's fault, but his own, for not knowing how to trench, and that as he had now *buried his garden*, he would just have to *dig it up again*! Well, he did, and fetched the buried topsoil to its proper place. Good gracious! what a crop of vegetables he did get off that twice aerated bit of land, to be sure. See now: nature gives us earth, water and air. We have got to mix them together and make soil of them wherein to grow our crops, nor must we ever let the water accumulate, instead of constantly slipping through among the earth particles and getting away. If it hangs, water-logging the soil, it drives out the vital air, and prepares slow death for the roots.

P.M.O.

Notes on the Season's Fruit Crop.

The fruit and grape season being now nearly over, it is evident that it has been one of the best we have had for years both in respect to quantity and quality.

In the direction of fruit growing the exertions of past years began to produce appreciable and encouraging results as far as an increasing output of really good fruit is concerned, particularly in the growth of pears, since the standard varieties planted some five or more years ago have now attained the bearing age; thus we may look forward to a considerable increase in the production of that fruit within a very short time.

Of new fruits recently introduced to South Africa the Wickson plum has this season, for the first time, produced quantities which admit of an opinion on the merits of that variety, and it appears to be a valuable addition to the list of successful Japanese plums in this country. The fruit, besides being large and resembling in shape the Kelsey plum, is attractive and an excellent keeper, colouring well even when picked a considerable time before being fully ripe. The tree is a vigorous upright grower, bearing strong resemblance to the trees of the lemon plum, and its cultivation can confidently be recommended.

The fruit-drying industry has also been in evidence, from 170 to 180 tons of fresh apricots having been handled by the Pioneer Fruit-drying Company at Wellington. Unfortunately the production of dried apricots is surrounded with certain difficulties increased by the present scarcity of labour. For instance, apricots ripen with such rapidity that individual farmers on an average handle not more than 1,000 trees, and the fruit must be worked off within a very limited period of time, as may be seen from the fact that of the 180 tons before mentioned, approximately 110 tons had to be dealt with between the 16th and 21st of December.

Of prunes, I understand a fair quantity has been produced in the Drakenstein district with satisfactory results. Unfortunately, the tree itself gives trouble, as, according to our present experience, it varies considerably in its adaptation to districts. It undoubtedly answers well in the strong fertile soils of the Hex River Valley, but suffers from the attacks of a mite, which, turning the leaves prematurely yellow and causing the fruit to drop, makes the cultivation of that tree problematic unless cheap and effective means of reducing the ill effects of the mite are systematically applied. In the Wellington district the tree seems to be generally a failure, in any case a doubtful success, for many of the trees, put out here a considerable number of years ago, have not yet yielded returns and are generally of a condition which induced several farmers to abandon their cultivation. In the Paarl division, particularly in the cooler parts of Drakenstein, the tree is more encouraging, and said to do well on some individual farms. It answers better in the Stellenbosch division than in any of the foregoing places, and primarily in the parts where the climate is tempered by the influence of the sea-breezes or where an elevation of a thousand and more feet produces the same effect. Though the trees may not grow with the same rapidity and may not produce the same quantity as in other parts, the general condition of the plantations in that division is most excellent. I am therefore personally convinced that a large portion of land in that district, at present uncultivated, is capable of yielding handsome returns if planted in prunes grafted on peach, which is the most suitable stock for it.

Experiment.	Composition of Soil.				Manure used per Morgen.			Return per Morgen.			Total Return per Morgen.	Returns in favour of Manured Block.	Remarks.
	Nitrogen.	Potash.	Phosphoric Acid.	Lime.	Nitrate of Soda.	Sulphate of Potash.	Superphosphate.	1st Year.	2nd Year.	3rd Year.			
1*a*	·104	·198	·065	..	..	..	..	6·349	7·768	7·480	21·597	..	Land generally poor; vines 13 years old on Jacquez.
1*b*	·104	·198	·065	..	800	400	1,600	13·039	15·681	17·468	46·188	24·591	
1*c*	·104	·198	·065	..	..	400	1,600	8·800	9·563	11·044	29·407	7·910	
2*a*	·094	·206	·185	24	..	..	..	3·580	15·840	12·760	37·180	..	Land rich but stony; vines 8 years old on Jacquez.
2*b*	·094	·206	·185	24	800	700	800	15·400	24·772	19·360	59·532	22·352	
2*c*	·094	·206	·185	24	..	700	800	12·760	18·480	16·720	47·960	10·980	
3*a*	·102	·179	·216	13	..	..	..	8·880	13·288	13·288	35·456	..	Land rich; vines 8 years old on Rupestris Monticola.
3*b*	·102	·179	·216	13	400	400	800	17·380	25·960	21·560	64·900	29·444	
3*c*	·102	·179	·216	13	..	400	800	13·640	17·820	17·820	49·280	13·824	
4*a*	·080	·174	·036	..	..	..	..	24·203	24·684	..	48·884	..	Vines 10 years on Riparia.
4*b*	·080	·174	·036	..	800	400	1,600	34·419	34·859	..	69·278	20·394	
4*c*	·080	·174	·036	..	..	400	1,600	27·940	28·567	..	56·507	7·523	
5*a*	·086	·178	·036	..	..	..	..	26·840	..	..	26·840	..	Vines 10 years on Solonis. Low lying humid.
5*b*	·086	·178	·036	..	1,600	400	1,600	32·780	..	..	32·780	5·940	
5*c*	·086	·178	·036	..	..	400	1,600	30·360	..	..	30·360	3·520	

In respect to viticulture, this season has also been a favourable one; it is in fact a record season, as the quantity exceeds all expectations, and the quality of grapes was most satisfactory from a wine-making point of view. Some individual farmers have had such crops as they have never experienced before, and I know of some who produced from about half their area under grafted vines the same quantity of wine as was made from their total area prior to the appearance of Phylloxera. The increased production of the grafted vine over the ungrafted is thus the prominent feature of this year's vintage; in fact, it is so astonishing that I must put on record the following returns:—

1. 650 trellised Green Grape 5 or 6 years old, planted 6 by 4, yielded an average of 9lbs. per vine, which would be equal to 8 tons, or 8 leaguers of wine per acre.
2. Stein under the same conditions averaged on about half an acre 15 lbs. per vine, or 13½ tons, equal to twelve leaguers per acre.
3. 1,200 Hermitage, trellised six years, 4 by 4, averaged 11 lbs. per vine, equal to nearly 15 tons per acre, or the same number of leaguers of wine per acre.
4. 465 Hermitage, trellised 4 by 6, five years, averaged 14½ lbs.; they having, in addition to stable manure, received a dressing with basic slag.

It does not require much explanation to show that to maintain the fertility and general good condition of such vines, cultivation must be intensive with a plentful supply of either stable manure or artificial fertilisers. The former becoming more difficult to obtain, except at great cost and inconvenience to the farmer on account of its bulk, the use of the latter will necessarily demand serious attention in the near future. Since we as yet do not possess any reliable data of their effect, resulting from local tests, we shall have to revert to foreign experience as per tabulated results in France, published in *Le Progrès Agricole et Viticole*. The composition of the manure not being given, it must be assumed that the fertilisers used in the tests were of the usual commercial strength, and contained therefore, approximately the following amounts of fertilising element for every 100 lbs. used, viz., nitrate of soda 16, superphosphate 16, and potassium chloride 45 lbs. Hence the quantity of fertilising matter applied in the various experiments were (1b.) 128 nitrogen, 180 potash, 256 phosphoric acid; (2b.) 128 nitrogen, 315 potash, 128 phosphoric acid; (3b.) 64 nitrogen, 180 potash, 128 phosphoric acid; (4b.) same as under (1b.), and (5b.) 256 nitrogen, 180 potash, and 256 phosphoric acid; of which (3b.) produced the best results. In interpreting the foregoing results for the purpose of guidance here, one must bear in mind that, as our soils are poor in lime, basic slag, as the more suitable for phosphatic manures, should have the preference over superphosphate.

Calculating on the local prices of artificial fertilisers with an allowance for transport and application, and calculating that approximately 2,200 lbs. of grapes are being required to yield a leaguer of wine, reckoning the average market value per leaguer at £6, the profit and loss account under our conditions would be as follows:—

Experiment	1b.	cost of manure	£14 8 0	gain on wine 11 leaguers, 3 years' profit £51 12 0
,,	1c.	,, ,,	£8 8 0	gain on wine 3½ leaguers, 3 years' profit £12 12 0
,,	2b.	,, ,,	£13 14 0	gain on wine 10 leaguers, 3 years' profit £46 6 0
,,	2c.	,, ,,	£7 14 0	3 gain on wine 5 leaguers, 3 years' profit £22 6 0
,,	3b.	,, ,,	£8 12 0	gain on wine 13 leaguers, 3 years' profit £69 8 0
,,	3c.	,, ,,	£5 12 0	gain on wine 6 leaguers, 3 years' profit £30 8 0
,,	4b.	,, ,,	£14 8 0	gain on wine 9 leaguers, 2 years' profit £39 12 0
,,	4c.	,, ,,	£8 8 0	gain on wine 3½ leaguers, 2 years' profit £12 12 0
,,	5b.	,, ,,	£20 9 0	gain on wine 2½ leaguers, 3 years' loss £5 9 0
,,	5c.	,, ,,	£8 8 0	gain on wine 1½ leaguers, 1 year's profit 12/-

As these results are very encouraging, farmers might give the application of artificial manures in the vineyard a trial, applying phosphatic and potash manures early in winter, and nitrate of soda towards the end of the same.

In conjunction with vine-growing, it is also satisfactory to observe how the use of machinery is spreading, inasmuch as a number of égrappoirs have recently been put up in this division. The advantage of these machines, especially when driven by horse-power, is very great if one considers the labour saved and the possibility of bringing in the grapes with a more or less uniform percentage of sugar, though a large quantity of fruit must be handled.

Messrs. Louw Bros., on whose farm, Necklingshof, an égrappoir has been put up, inform me that with ten men, seven women and one wagon they manage to harvest 196 leaguers of wine, and state that they could easily handle double the quantity per day. The grapes run from the égrappoir into a trolley tank-car made of wood, which runs on rails laid through the cellar so as to admit of bringing the crushed grapes alongside of the fermenting tubs into which they are transferred to undergo the usual treatment of vinification; the total cost of installation running to about £80.

C. Mayer,
Agricultural Assistant.

Meeting of Horticultural Board.

The usual quarterly meeting of the above Board was held on the 7th inst., and there were present Messrs. C. W. H. Kohler (Acting Chairman), P. N. Mallison, W. van der Byl, J. P. Roux, Rev. S. J. du Toit, C. Lounsbury and C. Mayer.

After the minutes of the previous meeting had been read and confirmed, the Secretary laid on the table the usual returns of imports, from which it appeared that the total import during the last two months through Cape Town and Port Elizabeth amounted to 21,069 packages of potatoes, 1,702 fruit, 52 plants and 2,070 onions.

Next a letter from the Agricultural Department was read, advising the Board that the General Manager of Railways had arranged to use as far as practicable covered trucks for fruit transport and have such trucks sealed.

Mr. Mallison complained on that point that in spite of these precautions one of their consignments had, on arrival at Bloemfontein, eight boxes stolen and a number damaged. He had further complaints in respect to the Department not allowing his Company to keep a seal at their Siding, and that the Railway Department undertook to despatch by passenger train from Touws River but that some fruit was often left behind.

It was decided to keep the matter over for discussion at their next meeting. A letter was then read from the Agricultural Department saying that the Secretary of Agriculture had agreed to Mr. C. Mayer's appointment as Secretary to the Board. Mr. Mayer said that he had agreed to take office under the understanding that he would retain his seat as Government representative and his vote. This was agreed to.

With regard to the proposal of the Board subscribing to a number of agricultural publications, it was decided that the Board should do so to all the publications mentioned in the Agricultural Department's letter. Further, that these publications be sent to the libraries of different districts represented on the Board unless the secretaries of the Agricultural Societies advised otherwise. The publications are New South Wales Gazette, Queensland Agricultural Journal, Journal of Bureau of Agriculture, South Australia, Journal Department of Agriculture, Perth, Western Australia, and Year Book of the Agricultural Department, U.S.A.

The report of the Committee appointed to enquire into the working of the Industrial Schools for Poor Whites was then read, and it was resolved to circulate copies of same among the members and discuss the report at their next meeting.

The proposal of Mr. Monckton's re-establishment of an Agricultural Museum was treated in the same way.

The Chairman then said that, as many people were coming to the country with the intention of settling in the Western Districts, he thought the Board should aid such new-comers with their advice through their Secretary. Mr. Mallison, however, considered it better that the Secretary upon being approached by new-comers pass them on to members of the Board after he had satisfied himself as to the *bona fide* intention of such applicants to become farmers. This was agreed to.

The Secretary reported next that two bales of fly netting, having arrived in September last, had not yet been delivered by the Harbour Board, and that he feared that the supply had been lost. He was instructed to demand compensation and order a fresh supply for next year.

The Secretary then gave notice that at their next meeting he would move:

1. That in future the meetings should commence at 10 a.m.
2. That the Board approach the Government with a view to securing for their members the right to send communications in respect to the Board's business to their Secretary, on Public Service.
3. On behalf of Mr. P. J. Cillie, C. son, that the Board protest against the article on Citrus culture appearing over the signature of Prof. MacOwan in the *Agricultural Journal* of the 19th December, 1901 and 2nd January, 1902.

The meeting then adjourned.

Return of Fruit Exported

DURING THE MONTH OF FEBRUARY, 1902.

Port.	Variety of Fruit.	No. of Packages	Quantity.		Declared Value.		
					£	s.	d.
Cape Town ...	Nectarines ...	328		9,100	108	18	0
	Peaches ...	1,007		22,685	367	18	6
	Plums ..	1,072		32,500	336	5	0
	Pears ...	291		6,960	95	10	0
	Grapes ...	1,695	lbs. 33,022		659	1	0
		4,393	lbs. 33,022	71,245	£1,567	12	6
East London	Pine Apples	1		450	£1	0	0

Cyanide Gas Remedy for Scale Insects.

This is the title of an invaluable pamphlet by the Government Entomologist, Mr. C. P. Lounsbury, couched in simple language and well illustrated. It contains a full description of the equipment necessary for the treatment of scale-infested trees with hydrocyanic acid gas and explicit instructions for its employment. It will be supplied by the Agricultural Department free on application.

STOCK FARMING.

Sheep Breeding.

Many farmers will remember that an announcement appeared in the *Journal* relative to an International Conference of Sheep Breeders held at the Guildhall, York, in June, 1900. Copies of the resolutions passed at the meeting were sent from the Agricultural Department to the Secretaries of all Farmers' Associations and Agricultural Societies, but only one recipient, a Farmers' Association, wrote a reply expressing concurrence with the resolutions.

The following is a copy of the resolutions :—

(1) That it is desirable that regulations be framed as between the Sheep Breeders' Societies hereto subscribing for the transference of registered sheep from their record in one country to the record of another, and to devise means to prevent the substitution of unregistered sheep for registered sheep when purchased for breeding purposes in any country other than that in which they were born.

(2) Societies exporting sheep shall, with every sheep already registered, send the official export certificate of the Exporting Society, whereupon shall be recorded in full its pedigree and Registered Flock Book number, signed by the Secretary of the Society to which it belongs, and stamped with the corporate seal of the same ; but where a sheep is eligible for registration, but has not yet received a Registered Flock Book number, a provisional number shall be given to the sheep by the Secretary of its Society (incorporating in the export certificate the numbers indicating the individual identification of the sheep), and the Flock Book number of the sheep shall be sent to the Secretary of the Sheep Purchasers' Society as soon as the Flock Book wherein it is recorded is issued. The vendor of the sheep sold shall apply for the said export certificate or Certificates, giving his own and consignee's full name and address, together with the name of the country to which the sheep is going, and

(a) Every Export Certificate shall be accompanied by a sanitary certificate signed by a duly qualified Veterinary Surgeon, testifying that the animal or animals in question are not suffering from any disease, and by a sworn affidavit from the vendor to testify that no contagious disease has existed on the farm for three months previous to the date of their shipment, and that they have not been in contact with any diseased animals during that time ; and any other certificates which the import regulations of any importing country may from time to time require.

(*b*) That the Secretary of every Society issuing export certificates shall thereupon inform the Secretary of the Society to whose record the sheep are being transferred of the issue of the said certificates, the name and number of its breeder, its vendor, the consignor, and consignee of the same.

(3) Societies admitting imported sheep to their registers shall request the production of the official export certificate issued in accordance with paragraph (2), and on its receipt shall accept the transference of the said sheep from its Society in the exporting country, and forthwith register and record the same in its record at the same fees as are payable for home-bred sheep.

As the great majority of English-bred sheep which are imported into this Colony are used for the purpose of cross-breeding, the importance of the above regulations framed by the Sheep Breeders' Association in England may not readily appeal to South African sheep farmers. It is, however, strongly recommended that any sheep farmer who aims at maintaining the purity of any such breed should keep a private register. This would prove of great value to him when the time arrives—and it is not likely to be far off—when there will be a continued demand for increased carcase. Such a register would enable the owner of the flock to sell his rams to better advantage.

The Argentine Agricultural Show.

We recently published an extract from an Argentine correspondent's letter, and now the following notes supplied to us by the British Consulate at Buenos Ayres of the annual Agricultural Show is interesting as a further illustration of the sheep troubles of the country and future prospects.

The Show, held last September, was the 6th of the regular series started in 1895. Only animals born in the Republic were eligible for prizes.

Adverse factors necessarily lowered the value of the sheep, especially of the Lincoln breed. The low price of cross-bred Lincoln wool, of which probably 80 per cent. of the clip is composed, militated strongly against high prices, and the same cause rendered money scarce among the smaller farmers. The plague of "worms," also, has to-day reached such a climax throughout the length and breadth of the land that whereas, until recently, sheep were the stand-by of the farmer, to-day every man who can, is selling off his sheep to stock with cattle in their place. Of course this haste to change the class of stock is not so much caused by "worms" as by the ruinous price of wool, but it is yet the fact that in some districts the disastrous effects of the "worm" visitation is evidenced by wholesale abandonment of sheep. While wool, Lincoln cross, remained at the fabulous prices of two or three years ago the plague was condoned. To-day, with no exterminating plea for it, on the ground of valuable fleece, the animal that grows it is reckoned an encumbrance, and is being sold wholesale at even one shilling per head, eighteen pence to half a crown for excellent sheep, though three years ago as much as five and eight shillings was greedily accepted as good value, according to current rates.

NUMBER OF ANIMALS EXHIBITED.

The animals assembled were 1,727 head of horned cattle, 1,702 sheep, and 270 horses, besides poultry, and an excellent collection of agricultural machinery including sheep-shearing machines and cream separators at work, agricultural instruments of all sorts, apparatus for dipping for scab, aermotors, &c.

HORNED CATTLE.

In the Argentine Republic there is virtually only one breed of horned cattle recognized: the Shorthorn. Herefords there are, but their patrons are few, and fewer still are those who favour Polled Angus. As for the other breeds such as Devons, Holstein, Swiss and Channel Island, they are so few in the Argentine as hardly to be worth mentioning.

The National Census of 1895 revealed the fact that there were 21,701,526 head of horned cattle in the Republic, of which the Durham breed, pure and cross-bred, claimed 2,425,844, while only 314,553 Herefords were counted, or say sixty-nine Durhams to every Hereford.

As a natural consequence, the show of Durhams, both male and female, immensely predominated.

The highest prices realised for them were £700, £680 and £610. Such instances of course are not a sufficient guide for the establishment of current prices; but it may be added that fifty Shorthorn bulls offered for sale by six stud-farms realised an average of £317 each.

Eight heifers of the same breed averaged £60 each, a price, however, that was equalled in the previous year by the same breeder.

Curious to relate, there was no class for milch-cows.

At the Show there were two solitary specimens of the Devon breed sent over for sale by Dr. French of the Cabana, Loraine, in the Republic of Uruguay, where the breed is acquiring a good deal of favour.

In the North of the Province of Jujuy, on the borders of the tropics, Messrs. Leach Bros., the well known English sugar and coffee planters, have obtained good results with Hereford cattle, and it is probable that this breed has a future before it, both in the hot and the cold extremes of the Republic, which it will be remembered stretches from within the tropics 22° South to 56° South latitude.

Neither the champion Durham nor champion Hereford was sold. It was said that £1,250 was refused for the Shorthorn and £1,666 for the Whiteface. Ordinary bulls for herds fetched from £25 to £60.

SHEEP.

By far the largest number of animals exhibited were of the Lincoln breed, but there was also an excellent show of Merinos, chiefly Rambouillet.

An Australian present remarked that the Argentine Republic was evidently ahead of his country as regards Lincoln, but that the British colonies in Australia could produce better cattle.

The highest price realized for a ram was £680, for a magnificent Rambouillet presented by Messrs. Lozano Bros., the German merchants and "Estancieros," Messrs. Roth and Co. coming next with £300 for the champion Merino.

In the Lincoln breed, Mr. Robert Walker, a Scotch "Estanciero," obtained the championship for a beautiful animal with long, lustrous, silky wool, which was sold at auction for £142. Señor Cecilio Lopez obtained the next highest price, £117. Mr. John Sewell, a well known English breeder, following close behind with £104.

The number of Lincoln rams presented for show and sale far surpassed the demand, and very many remained unsold at the close of the show. Some of these were subsequently sold at extraordinarily low prices, as low as twelve shillings being realized for animals that but three years ago would have fetched at least from four to six pounds sterling.

The black and brown faces were poorly represented, and some that were shown were hardly in exhibition trim. Hitherto Shropshire and the Down varieties have met with little favour in Argentina, owing to the poorness of their fleeces.

The Shropshire stands the excessive heat of the more Northern lands far better than the Lincoln, and its carcase is more sought after to-day by the Frigorific Companies, since it is smaller and of finer qualities than that of the, until recently, favourite Lincoln. Some good Shropshire were shown and also some Hampshire and Oxford-Downs, but they were quite overshadowed by the Lincoln and Rambouillet exhibits.

HORSES.

Mr. George Bell was especially successful with his Clydesdales, and animals of this favourite breed fetched as high as £180, while the cross-breeds realized nearly £40, one with another.

A Percheron realized £200, perhaps the highest price paid for stallions.

The pure-bred Hackneys were sold at prices ranging between £60 and £100, while the cross-breeds obtained about £40.

During the two days that the horses were dealt with, animals to the value of £6,000 were disposed of.

MACHINERY.

Interest centred principally in the aermotors and shearing machines, which were shown at work. Shearing machines are steadily coming into favour, the "Wolseley" obtaining far the greatest amount of patronage.

The advantages of raising water for the flocks and herds by means of aermotors are also being recognized more fully every day, and these machines will eventually almost totally supersede the antiquated methods hitherto employed. The original "sleeve" of hide drawn at the "cinch" (from the girth of the horse) was ousted by the iron bucket with a valve in the bottom, and by the endless buckets on a chain, both worked by horses or mules, and now the aermotor promises shortly to relegate all these systems to the past, together with the primeval pole, swinging between two uprights, with a weight at one end and the bucket at the other, worked by hand, a method employed in the early ages in Palestine and the East.

It is generally felt that with the restoration of peace to South Africa an immense field will be opened up for Argentine exports of live-stock, which should enable the country to dispose of its surplus, even though the ports of the United Kingdom remain closed.

REMARKS BY DR. HUTCHEON, CHIEF VETERINARY SURGEON.

I have read this report with much interest. It is very evident that they are as much, if not more, troubled with worms in their sheep than we are, and that sheep farming in the Argentine, although there is an apparent revival in merinos, is far from being in a healthy, thriving condition.' I notice also that they are beginning to find out that the butchers do not like the large Lincoln sheep as well for slaughter as the more compact Down sheep. This is the experience in England; the people object to the large fat chops of the large long-woolled sheep such as the Lincoln and Leicester breeds.

The Argentine is manifestly a great cattle country, their large luxuriant pastures being very favourable to the rearing and feeding of the beef breeds such as the Shorthorn, Hereford and Aberdeen Angus. The prices paid for some of the best specimens of these breeds appear to us fabulous. I know that they have been, until last year, the largest purchasers of the best Shorthorn cattle in Great Britain. To anyone wishing to import good Shorthorn cattle, I imagine that these can be obtained of as good quality, and as cheaply, in the Argentine as anywhere. They have evidently not cultivated the dairy breeds so much there, and these are what are mostly required in this country. We cannot fatten high class cattle on our pastures readily enough to bring them to early maturity, besides which we will have an ever-increasing demand for dairy produce. It is therefore this branch of the cattle industry which, in my opinion, should receive most attention in South Africa.

MISCELLANEOUS.

To Test Whether a Cow is in Calf.

A correspondent in *Queensland Country Life* tells of a test he uses to determine whether his cows are in calf or not. We should like to hear from anybody who uses the test. He says:—

"The cow to be tested is, of course, milked separately, and as soon as possible after the milk is drawn we dip a straw or Timothy stem in the bucket of milk. Have a glass of pure water at hand, and allow one drop of the milk to fall in the water—only one; if the milk quickly dissipates and renders the water murky she is not in calf, but if the milk drop sinks to the bottom of the glass before mixing with the water she is pregnant. If you are not sufficiently expert, take the milk of another cow that has newly calved, and pursue the same treatment with both at the same time, and you will not fail to note the difference in the way the drop of milk will mix with the water. I have practised this method of determining pregnancy in my herd for years, and I never knew it to fail. Of course, I only speak from my own experience, but the theory is that the milk of a pregnant cow is viscous, or has a sticky, adhesive quality that causes the particles to cohere more closely, consequently the tendency to drop in a mass instead of mingling immediately with the water. I usually take the morning's milk for the test, and use cistern or rain water if you have it, or, better still, filtered or boiled water."

Orthezia Insignis—Another Introduced Scale Pest.

Growers of coleus plants and gardeners generally may recollect articles which appeared in the *Agricultural Journal* and the Public Press during the year 1898, calling attention to the discovery of the scale insect pest known as the *Orthezia insignis* in the suburbs of Cape Town.

It was hoped that, through the active measures then taken, the outbreak had been nipped in the bud, more especially as an inspection of the various floral establishments in town had failed to reveal the presence of the pest.

Unfortunately this hope has not been realised and the insect has now again made its appearance in a lantana hedge near the Camp Ground, Rondebosch, and in several similar hedges on an old estate in Mowbray, and it is probable that it has already become widespread.

Much of the young growth of the lantana is killed by the orthezia and the wood and remaining foliage becomes discoloured by a soot-like fungus that grows on an exudation from the insect, entirely spoiling the appearance of the hedge.

Orthezia insignis is particularly partial to the lantana, but is also frequently found on other garden plants such as verbena, lavender, fuchsias, &c., and is death to the coleus.

With a view to prevent as far as possible the spread of the pest, the public are recommended not to plant hedges of lantana, and are urged to take active measures for checking the spread of the scale by rooting up and destroying a hedge as soon as the appearance of the scale insect therein is noticed.

COUNTRY REPORTS.

East London.

THOS. WILLOWS, F.C., 3rd March, 1902.—Considerable provision has been made for sowing Algerian seed oats somewhat earlier than last season, the object being to reap in November, or in any case early in December, in order to escape the annual invasion of locusts which usually takes place about the middle of the latter month. Much concern is, however, felt with regard to the many swarms of young locusts in this neighbourhood, and doubts are freely expressed relative to the risk attached to sowing when they would be in the flying stage. The outlook is gloomy in this connection, but I am compelled to add that not a single application (one excepted) has been made to the local Locust Board for spraying material, and the only explanation I can give is that as the destruction of locusts is not compulsory there is no possibility of securing united action, and many will not expend time, energy and money when their neighbours are apathetic and careless. Light rains have caused the veld to look somewhat green, but water for stock is scarce and in several parts stagnant. Other matters are much the same as last month.

Artificial Manures.

The annexed list showing the agents from whom the various artificial manures may be obtained, and the current prices, is publiseed for the information and guidance of agriculturists.

Full particulars as to the composition of the respective fertilizers can be obtained on application to the agents; and attention is also invited to the analyses published in the *Agricultural Journal* of 9th January, 2nd April and 11th June, 1896; 30th Sept., 1897; 27th Oct., 1898; 13th Agril, 6th July, 1899 and 18th July, 1901.

List of Fertilizers.

Attwell & Co., Cape Town. (Agents for Alex. Cross & Sons, Ltd., Glasgow.)	Special Root Guano ..	£6	10	0	per ton of 2,000 lb,
	Potato and Grain Guano ..	8	5	0	,, ,,
	Nitrate of Soda	12	0	0	,, ,,
	Superphosphates 39/40 per cent ..	6	0	0	,, ,,
	Scotia Basic Slag (cont. 30 per cent. Tribasic Phosphate of Lime)	4	15	0	,, ,,
	Sulphate of Ammonia ..	0	19	6	per 100 lb.
	(Prices free on trucks, Cape Town)				
Jas. Searight & Co., Cape Town.	No. 1 Superphosphates .. (containing 12·14 per cent. Phosphoric Acid soluble in water, being equal to 26·30 per cent. Tribasic Phosphate of Lime). ..	£5	0	0	per ton of 2,000 lb.
Jas. Searight & Co., Cape Town.	No. 2 Superphosphates .. (containing 14 16 per cent. Phosphoric Acid soluble in water, being equal to 30·35 per cent. Tribasic Phosphate of Lime). ..	5	10	0	
	No. 3 Superphosphates .. (containing 17·18 per cent. Phosphoric Acid soluble in water, being equal to 37·39 per cent. Tribasic Phosphate of Lime). ..	£6	0	0	per ton of 2,000 lb.
	Vine Fertilizers	9	0	0	

A reduction of 5s. per 2,000 lbs. is allowed on orders of 100 bags or more. Special rates can be arranged if delivery is taken ex importing steamer, the goods being trucked at Docks.

Woodhead, Plant & Co. Cape Town.	**Thomas' Phosphate Powder ..**	**£4**	**15**	**0**	**per ton of 2,000 lb.**
	Superphosphates ..	**5**	**15**	**0**	,, ,,
	Nitrate of Soda ..	**14**	**0**	**0**	,, ,,
	Muriate of Potash ..	**16**	**0**	**0**	,, ,,
	Sulphate of Potash ..	**16**	**0**	**0**	,, ,,
	Wheat Fertilizer ..	**8**	**10**	**0**	,, ,,
	Kainit	**4**	**15**	**0**	,, ,,
	Potato	**1**	**15**	**0**	**per 200 lb.**
	Vineyard Manure ..	**1**	**15**	**0**	,,
	Tobacco Manure ..	**1**	**15**	**0**	,,
	Sulphate of Ammonia ..	**1**	**2**	**6**	**per 100 lb.**
	Subject to a discount for cash.				
De Waal & Co., Cape Town.	**Jadoo Fibre .. ..**	**10s.**	**6d.**		**per bale of 100 lb.**

White, Ryan & Co., Cape Town.	Potato, Vegetable and General garden	£8 10s. per ton of 2,000 lb. If less than ½ ton 18s. 6d. per bag of 200 lb.
	Pure Ground Bone	£6 10s. per ton of 2,000 lb. If less than ½ ton 13s 6d. per bag of 200 lb.
White, Ryan & Co., Cape Town.	Quick-acting Bone and Potash Mixture	£7 per ton of 2,000 lb. If less than ½ ton 16s. per bag of 200 lb.
	Selected Bone Meal for Cattle, Horses, Pigs and Poultry	15s. 6d. per 100 lb.; special price per ton.
	Bone Grit for Fowls	12s. 6d. per 100 lb.
	Superphosphates	Wholesale only.
Malcomess & Co., E. London.	"Malcomess" A. Fertilizer, for Potatoes, Mealies, Vegetables, Orange and other trees	£9 per ton of 2,000 lb.
	"Malcomess" B. Fertilizer, for cereals, especially wheat	£9 per ton of 2,000 lb.
	Accompanied by guaranteed analysis by Prof. Hahn	(less 5 per cent for cash).
James Flower & Sons, Cape Town.	"H.B.T." Gypsum	£3 10s. per ton of 2,000 lb.
	Pure Ground Bone Meal	£8 10s. ,, ,, (in bags f.o. trucks—Cape Town).
Government Guano :—	Ordinary Guano	£6 10s. per ton of 2,000 lb. or 13s. per bag of 200 lb.
	Rock Guano	£6 17s. per ton of 2,000 lb. or 13s. 9d. per bag of 200 lb.

For use within limits of Colony.
Price includes delivery at Cape Town Railway Station.

D. E. Hockly & Co., East London.	"Hockly's Special Fertilizer." A complete manure for all crops	£9 per ton of 2,000 lbs. less 5 per cent for cash.
	Pure Bone Meal	Special Price.

VETERINARY.

Redwater, Anthrax and Quarter-Evil.

REDWATER.

In all outbreaks of Redwater, in which there are a number of cattle still unaffected in a herd, but which nevertheless require to be placed in quarantine on the infected farm, owners are advised to spray or hand-dress all the healthy cattle with a paraffine oil emulsion, or any of the carbolic sheep dips, in order to clear off the ticks as far as possible, which are the medium of the infection. It is also of great advantage to dose each of the unaffected animals daily with a teaspoonful of carbolic acid mixed in a pint of raw linseed oil. The adoption of these precautions would tend to arrest the spread of the disease in a herd, which quarantine alone does not effect. In districts in which the disease is prevalent or extending, all owners of healthy cattle should take the precaution to have their herds inoculated in the early summer months before the disease appears amongst them, as about that time the operation can be carried out with greater safety and efficiency.

ANTHRAX AND QUARTER-EVIL.

Attention is directed to the importance of the proper burial or burning of carcases of animals which die of either of these diseases. The infective micro-organisms which are the orginating cause of Anthrax and Quarter-Evil are capable of living and multiplying in the soil; consequently—unless the affected carcases are buried at a depth of not less than five feet, which would be sufficient to prevent the air from penetrating to them, and the organisms themselves from getting to the surface—every carcase becomes a fresh centre of infection. The proper burial of all carcases of animals which have died of either Anthrax or Quarter-Evil should therefore be insisted upon, as well as the thorough disinfection of the spots where the carcases lay previous to burial.

D. HUTCHEON,
Colonial Veterinary Surgeon.

Department of Agriculture,
Cape Town, 17th March, 1902.

GOVERNMENT NOTICES.

Seed Oats.

In connection with the Notice appearing in the *Agricultural Journal* of the 14th March, 1901, and subsequent issues, it is notified for the information of farmers and others interested, that a small quantity of "*Texas Rust-resistant*" and "*Algerian*" Oats, raised from seed imported by the Government, is now available for distribution for experimental sowing, at 19s. per bag of 150 lbs.

Applicants must pay carriage from Cape Town Station.

As the quantity of seed at disposal is very limited, not more than 2 bags can be allowed to any one person.

Applications, accompanied by a remittance to cover cost of the seed, should be sent in, at once, addressed to the Under Secretary for Agriculture, Cape Town; and will be dealt with in the order in which they are received.

Cape Government Railways.

ADMISSION OF APPRENTICES INTO THE LOCOMOTIVE DEPARTMENT.

There are vacancies for Apprentices in the following Branches of the Locomotive Workshops at Salt River, viz. :—

Boiler Shop	..	Three boys for heating rivets and cleaning Boilers, to learn the trade of a Boilermaker.
Carriage Shop	..	Two boys, to learn the trade of a Sawyer.
Carriage Shop		One boy, to learn the trade of a Carriage Fitter.
Carriage Shop		Two boys, to learn the trade of a Coach Builder.
Carriage Shop		Two boys, to learn the trade of a Coach Painter.
Blacksmith Shop		One boy, to work steam hammer ;

and applications from youths between the ages of 14 and 16 are invited for filling the vacancies.

Applicants must have passed the 5th Standard, and will be required to produce a certificate to that effect, and also certificates as to character.

Applicants who are able to produce proofs of having satisfactorily passed a higher standard of education will receive the preference in filling the vacancies, other things being equal.

The rate of pay to commence with will be 2d. per hour.

Applications should be sent to the Chief Locomotive Superintendent or Locomotive Superintendent, Salt River, from whom any further particulars can be obtained.

T. R. PRICE,
General Manager.

Office of the General Manager of Railways, Cape Town,
8th March, 1902.

Farmers' Apprentices. Dairy Assistants, &c.

As inquiries are from time to time received from young men from abroad as to where they may serve apprenticeship or gain practical experience of farming in this Colony, before starting on their own account, the Secretary for Agriculture invites Farmers who are willing to receive young men of good character, for this purpose, to register their names with the Under Secretary for Agriculture, stating the class of farming they do, how many young men they are prepared to take, and for what period they would enter into an agreement.

It is not probable that these young men will be in a position to give more than their free services in return for the experience they will gain ; that is, they will not be able to pay any fee ; and they will look to receiving free board and lodging in return for their services.

It is to Farmers, therefore, who are willing to grant such young men free board and lodging in return for services rendered, that this application is especially addressed.

With reference to the above notice to Farmers, the Secretary for Agriculture now invites young men who are willing to engage themselves as Farmers' Apprentices in Cape Colony to register their names with the Under Secretary for Agriculture, Cape Town. The apprentice will gain experience in farming in South Africa, and have an opportunity for spying out the land before starting on his own farm. To the new comer from another country this is essential, for he has much to learn and unlearn.

Many applications for such Apprentices have been received from Farmers in the Colony. It will be noted that the Apprentice will neither receive wages, nor pay a fee. He will get free board and lodging in return for his services, and at the same time acquire the experience he is in need of.

Applications for employment have also been received from several Lady Dairy Experts and Dairy Assistants ; and Dairy Farmers and others desiring to avail themselves of the services of such are invited to register their names with this Department, giving particulars as to situation and extent of operations, etc., and salary and other emoluments they are prepared to offer.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM BASUTOLAND.

By command of His Excellency the Governor, the following Proclamation No. 164, 1901, was published in the Government Gazette of October 29th, 1901:—

Whereas by Proclamation No. 100, bearing date the 4th day of June, 1901, I did, by reason of the existence of the disease amongst cattle known as Rinderpest in the Territory of Basutoland, prohibit the introduction of horned cattle from the said Territory into this Colony:

And whereas the said disease has spread to the portions of this Colony which adjoin the said Territory, thus rendering it unnecessary to longer maintain the prohibition imposed by the said Proclamation:

Now, therefore, under and by virtue of the powers and authorities in me vested, I do hereby proclaim, declare and make known that from and after the date hereof the prohibition upon the introduction of horned cattle from Basutoland into this Colony shall be removed: the said Proclamation No. 100 of 1901 being hereby repealed accordingly.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM ORANGE RIVER COLONY AND THE TRANSVAAL.

By command of His Excellency the Governor, the following Proclamation No. 139 1901, was published in the Government Gazette of August 16th, 1901:—

Under and by virtue of the powers vested in me by the "Animal Diseases Act," No. 27 of 1893, and by the "Animals Diseases Rinderpest Amendment Act," No. 2 of 1897, I do hereby proclaim, declare and make known that it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced into any part of this Colony from the Orange River Colony and the Transvaal, save and except such cattle as may be required to be introduced by the Government for the purpose of supplying Bile or Serum for inoculation against Rinderpest:

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed

And I do hereby further declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

Proclamation No. 217, bearing date the 29th day of October, 1900, together with the regulations issued thereunder, is thereby repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined Regulation for checking the spread of the infection is republished.

REGULATION ISSUED UNDER PROCLAMATION No. 30, DATED 20TH JANUARY, 1899.

Whenever under the provisions of Sections 11 and 12 of Act No. 27 of 1893, any area is declared or proclaimed to be an area infected with Rinderpest, it shall not be lawful for any person, animal, animal produce, article or thing, who or which may, in the opinion of the Magistrate of the District in which such area is situated, be liable to convey infection of Rinderpest, to leave or to be removed therefrom.

Inoculation Against Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of the Colony, it is desirable to inform stock-owners of the intentions of the Government as to dealing with the outbreak should it unfortunately become general in the Colony, and to advise stock-owners as to the best course to follow.

The Government propose that, as a general rule, cattle-owners themselves should perform the inoculation. Glycerinated Bile will be used, though circumstances may arise where it will be preferable to use Serum.

Bile Stations will be established in suitable places as necessity arises in localities where farmers have agreed to contribute the required proportion, say 5 per cent., of their cattle for production of the bile. It must be clearly understood that unless farmers are prepared to thus contribute the necessary cattle, it will be impossible for them to have the benefit of a Bile Station.

Glycerinated Bile will be issued free to contributors in proportion to the number of cattle contributed to a Bile Station. To non-contributors a fair charge will be made for bile if any be available for issue.

Serum will be charged for at the rate of £1 per bottle of ten doses.

A limited supply of Glycerinated Bile to meet emergencies will, for a time, be available, free of charge, from the Bile Station which has been established under arrangements with the Imperial Military authorities near Aliwal North.

As occasion requires, Demonstrators will be sent to instruct farmers in the method of inoculation, free of charge. They will, as a rule, inoculate only enough cattle to show how it is to be done, leaving the owner to continue the work. The Government will supply syringes on application to the Resident Magistrate, or to the Demonstrators at the following charges:—20 cc. capacity, 20s; 10 cc. capacity, 15s. This payment may be recovered on return of the syringe to the Magistrate, in good order.

After the experience gained during the outbreak of 1896-1898, the Colonial Veterinary Surgeon wrote* as follows:—

"The method of inoculation which I would recommend in future sporadic outbreaks of the disease is briefly as follows:—

"*Infected Herds.*—These should be inoculated at once with either serum or glyceri-
"nated bile; every animal which indicates infection by a rise of temperature should
"receive a large dose of not less than 100 cc. of serum, or 30 cc. of glycerinated bile;
"the latter should, by preference, be injected into the jugular vein, so as to secure its
"immediate action. Then from eight to twelve days after, all the animals in the herd
"which give no indication of being infected with the disease, or fever temperature,
"should receive an injection of pure bile; not less than 10 cc., and for large animals
"20 cc. This will confer a lasting immunity sufficient for all practical purposes.

"*Clean Herds.*—When it is decided to inoculate a clean herd, which is in danger of
"becoming infected through its proximity to diseased cattle I would recommend that
"the animals composing the herd should be inoculated first with 20 cc. of glycerinated
"bile, and to follow this inoculation in from eight to twelve days with an injection of
"from 10 to 20 cc. of pure bile. This will confer a strong and lasting immunity on the
"animals in the herd, and will be free from risk arising from the inoculation or of
"introducing the disease.

"*Use of Pure Bile.*—Pure fresh bile should not be used in an infected herd, if any
"of the other inoculating materials can be obtained, as it tends to intensify the
"character of the disease in those already infected, and its immunising effect is too
"slowly developed to protect the healthy cattle against infection, if they are left in
"contact with those already sick. If no other means are available, however, the
"temperatures of the whole of the cattle in the infected herd should be carefully taken
"by the clinical thermometer, and only those which register a normal temperature
"should be inoculated with pure bile, the others should be separated from the inoculated
"lot at once, and carefully tended. If glycerine can be obtained, the spare bile should
"be mixed with it in the proper proportions—one part of glycerine to two parts of
"bile. This mixture, after standing forty-eight hours, may be injected into the affected
"animals in large doses, not only with safety, but with marked benefit.

"*Preparing the Bile.*—The bile should be taken from an affected animal immedi-
"ately after death, or from one which is killed in the last stage of collapse.

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* See *Agricultural Journal*, June 6, 1899, in which will be found a full consideration of the different methods of inoculation.

"Biles of all shades of colour—except those which are red from the presence of blood—may be used, so long as they are clear and free from a putrid smell. Thin light yellow biles should also be rejected.

"All the galls extracted at one time should be mixed together, after standing separately for twelve to eighteen hours, so as to render them uniform in strength and immunising properties. Pure bile should be used on the second day after being drawn, unless it is kept in an ice chest, when it may be kept sweet much longer. But if pure bile is used as a second inoculation only, as above directed, it is not desirable to keep it longer than twenty-four hours.

"Glycerinated bile is made by adding one part of glycerine to two parts of bile, stir the mixture well, then mix all the biles taken at one time, and allow them to stand for eight days. But if there is urgency, the glycerinated bile may be used forty-eight hours after it is mixed.

"I would strongly recommend that in every outbreak of the disease that occurs, every drop of suitable bile, obtained from the animals which die, should be mixed with glycerine in proper proportions, two parts of the bile to one of glycerine, so that it may be preserved and made available for the inoculation of infected herds, and also for the first inoculation of clean herds which may be considered in danger. Pure bile for the second inoculation of clean herds can always be obtained when the disease appears in any locality, which would be the only reason for inoculating clean herds in the immediate vicinity."

Taking the Bile.—To remove the bile the animal must be laid on its left side, the skin and flesh on the right side immediately behind the last rib being cut through; the ribs being raised, the gall bladder will become visible. The gall bladder should be then punctured with a small knife and the gall allowed to escape into a wide-mouthed bottle. If wide-mouthed bottles are not available then ordinary whisky bottles may be used with an *enamelled* funnel, which can be procured at any country store. Every precaution must be taken that the operation is performed in a thoroughly clean manner, the hands of the operator and all knives, &c., being thoroughly cleansed before use.

Inoculating.—After having secured the animal to be operated upon, the necessary dose of bile is injected under the skin of the dewlap by means of a Hypodermic Syringe, care being taken that the point of the needle is not inserted into the flesh, but between the skin and flesh.

Symptoms of Rinderpest.

The Outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined description of the symptoms of Rinderpest is hereby published:—

The early symptoms of Rinderpest are a rise of internal temperature to 106 or 107° Fahr.; the animal stands with its head hanging down, ears drawn back and coat staring; it refuses all food and occasionally shivers. A mucous discharge flows from the eyes and nostrils; the extremities are cold, and the breathing is laboured and frequently accompanied with moaning. The inner part of the upper lip and roof of the mouth and all visible mucous membranes are reddened, and covered with an eruption of minute pimples, and later with a branlike exudation. The bowels are occasionally constipated, but in most cases diarrhœa sets in, the evacuations being slimy and very frequently of a dirty yellow colour. The prostration of strength is great, the animal staggering when made to move. In milch cows the secretion of milk is rapidly diminished, and soon ceases altogether. The disease usually ends fatally in from six to ten days.

It is generally believed that the infection is produced through the respiratory organs; from there the contagion becomes generalised. The contagion exists in the secretions and excretions, urine, saliva, mucous secretions of the nose, mouth and eyes, in the sweat, expired air, blood, and in all the tissues. It may be conveyed directly by the diseased animals, or indirectly by the dung, the bedding, the earth, hides, wool, meat, clothing, wagons or vessels, by people, dogs, sheep and chickens, &c. Contagion takes place only through short distances. When the weather is dry this is reduced to its minimum (about 27 yards), and the progress of the disease may be stopped by a ditch separating the diseased from the healthy animals.

In order to detect the earliest symptoms of Rinderpest, owners of horned cattle are warned of the urgent necessity for keeping a constant and close watch upon their stock. Any suspicious cases should be immediately reported to the nearest Resident Magistrate,

Field-cornet or Police Officer, and the sick animal kept separate till an inspection is made. Stock should be carefully examined daily by a responsible person, more particularly for any symptoms resembling those above described.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October, 1900:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

- (*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and
- (*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie

Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung sickness and are free from disease, or have been effectively inoculated against Lung-sickness and are free from disease, viz.:—

Number and general description of Cattle ....

Owner's name and address ....

In charge of..

Place to which Cattle are being sent..................................

(Signature)..

(Address)..

Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature..

(Address)..

Date.....................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle ....

Owner's name and address ....

In charge of..

Place to which Cattle are being sent..................................

(Inspector's signature)..

(Address)..

Date..................

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Tobacco Seed.

A small consignment of the following varieties of Tobacco Seed, viz.:—White Burley Havana, Yellow Oronoko, Virginia "One Sucker," Virginia Pryor, Blue Pryor, Connecticut Seed Leaf, and Maryland, have been obtained from America by the Agricultural Department. Sumatra, Long Leaf Gooch and St. Felix are shortly expected.

Applications, accompanied by the deposit of 5s., should be addressed to the Under Secretary for Agriculture, Cape Town; and will be dealt with in order of receipt.

The seed will be distributed in lots not exceeding 3 oz. each of any three of the above-mentioned varieties upon deposit of the sum of 5s. by each applicant, which amount will be refunded by the Government to all applicants who furnish a report in due course, giving full particulars as to the mode of cultivation adopted and the results obtained.

Degrees of Temperature during January, 1902.

Blueberg Strand. Mean Max. 70·3, Mean Min. 55·9, Mean of Month 63·1, Absol. Max. 82 on 31st, Absol. Min. 49 on 18th, Monthly Range 33.

S. A. College, Cape Town.—Mean Max. 75·3, Mean Min. 57·6, Mean of Month 66·4, Absol. Max. 93·2 on 31st, Absol. Min. 48 on 18th, Monthly Range 45·2.

Fire Station, Burg Street, Cape Town.—Mean Max. 78, Mean Min. 61·9, Mean of Month 70, Absol. Max. 95·8 on 31st, Absol. Min. 51·5 on 18th, Monthly Range 44·3.

Devil's Peak Plantation.—Mean Max. 68·2, Mean Min. 53·8, Mean of Month 61, Absol. Max. 82 on 23rd, Absol. Min. 49 on 17th and 29th, Monthly Range 33.

Simon's Town. Mean Max. 75, Mean Min. 61·6, Mean of Month 68·3, Absol. Max. 84·6 on 23rd, Absol. Min. 56·8 on 18th, Monthly Range 28.

Wynberg.—Mean Max. 73·9, Mean Min. 57·5, Mean of Month 65·7, Absol. Max. 83·8 on 24th, Absol. Min. 49·2 on 18th, Monthly Range 34·6.

Groot Constantia.—Mean Max. 72·3, Mean Min. 58·4, Mean of Month 65·4, Absol. Max. 84·5 on 31st, Absol. Min. 47·5 on 18th and 29th, Monthly Range 37.

Welterreden, Groot Drakenstein.—Mean Max. 80·1, Mean Min. 56·4, Mean of Month 68·4, Absol. Max. 96·6 on 23rd, Absol. Min. 47 on 18th, Monthly Range 49·4.

Danger Point. Mean Max. 72, Mean Min. 59·6, Mean of Month 65·8, Absol. Max. 87 on 6th, Absol. Min. 52 on 30th, Monthly Range 35.

Ceres.—Mean Max. 79·6, Mean Min. 51·5, Mean of Month 65·6, Absol. Max. 93 on 23rd, Absol. Min. 45 on 5th and 18th, Range of Month 18.

Worcester. Mean Max. 82, Mean Min. 55·7, Mean of Month 68·8, Absol. Max. 95·8 on 23rd, Absol. Min. 45·7 on 18th, Monthly Range 50·1.

O'okiep. Mean Max. 84·9, Mean Min. 55·3, Mean of Month 70·1, Absol. Max. 96·6 on 23rd, Absol. Min. 45·4 on 17th and 29th, Monthly Range 51·2.

Clanwilliam.—Mean Max. 88·6, Mean. Min. 56·1, Mean of Month 72·4, Absol. Max. 103 on 23rd, Absol. Min. 49 on 13th, Monthly Range 54.

Hopefield.—Mean Max. 83·3, Mean Min. 53·1, Mean of Month 68·2, Absol. Max. 100 on 31st, Absol. Min. 44 on 18th, Monthly Range 56.

Heidelberg.—Mean Max. 83, Mean Min. 58·8, Mean of Month 70·9, Absol. Max. 102 on 24th, Absol. Min. 49 on 18th, Monthly Range 53.

Storms River.—Mean Max. 75·5, Mean Min. 52·7, Mean of Month 64·1, Absol. Max. 104 on 24th, Absol. Min. 45 on 1st and 30th, Monthly Range 59.

Mossel Bay.—Mean Max. 73·2, Mean Min. 61·9, Mean of Month 67·6, Absol. Max. 88 on 24th, Absol. Min. 57 on 29th and 30th, Monthly Range 31.

Uitenhage.—Mean Max. 84·5, Mean Min. 58, Mean of Month 71·2, Absol. Max. 114 on 24th, Absol. Min. 49 on 6th, Monthly Range 65.

Cape L'Agulhas.—Mean Max. 70·6, Mean Min. 59, Mean of Month 64·8, Absol. Max. 76 on 3rd and 11th, Absol. Min. 51 on 30th, Monthly Range 25.

Dunbrody.—Mean Max. 86·2, Mean Min. 57·1, Mean of Month 71·6, Absol. Max. 112 on 25th, Absol. Min. 46·8 on 18th, Monthly Range 64·2.

Port Elizabeth.—Mean Max. 74, Mean Min. 61·3, Mean of Month 67·6, Absol. Max. 87 on 24th, Absol. Min. 55·6 on 18th, Monthly Range 31·4.

Cape St. Francis.—Mean Max. 72, Mean Min. 59·6, Mean of Month 65·8, Absol. Max. 81 on 25th, Absol. Min. 53 on 17th, Monthly Range 28.

Concordia (Knysna).—Mean Max. 74·2, Mean Min. 55·6, Mean of Month 64·9, Absol. Max. 104 on 24th, Absol. Min. 52·5 on 30th, Monthly Range 51·5.

Van Staaden's River.—Mean Max. 75·8, Mean Min. 55·9, Mean of Month 65·8, Absol. Max. 106·8 on 24th, Absol. Min. 47·7 on 18th, Monthly Range 59·1.

Amalienstein.—Mean Max. 86·4, Mean Min. 56·8, Mean of Month 71·6, Absol. Max. 106 on 24th, Absol. Min. 46 on 18th, Monthly Range 60.

Graaff-Reinet.—Mean Max. 85·8, Mean Min. 54, Mean of Month 69·9, Absol. Max. 98·1 on 11th, Absol. Min. 44·1 on 18th, Monthly Range 54.

Somerset East.—Mean Max. 85·9, Mean Min. 54·5, Mean of Month 70·2, Absol. Max. 103·4 on 21st, Absol. Min. 42·8 on 30th, Range of Month 59·6.

Steynsburg.- Mean Max. 87·8, Mean Min. 51·8, Mean of Month 69·8, Absol. Max. 97·2 on 7th, Absol. Min. 43 on 5th, Monthly Range 54·2.

Hanover.—Mean Max. 84·4, Mean Min. 58·4, Mean of Month 71·4, Absol. Max. 93 0 on 8th, Absol. Min. 44 on 16th, Monthly Range 49.

Hope Town.—Mean Max. 93.5, Mean Min. 59·7, Mean of Month 76·6, Absol. Max. 105·6 on 11th, Absol. Min. 48 on 4th, Monthly Range 57·6.

Kimberley. Mean Max. 93 2, Mean Min. 59 4, Mean of Month 76 3, Absol. Max. 103 on 7th, Absol. Min. 50·5 on 17th, Monthly Range 52 5.

Sydney's Hope.—Mean Max. 77 6, Mean Min. 55 8, Mean of Month 66·7, Absol. Max. 104 on 24th, Absol. Min. 48 5 on 18th, Monthly Range 55·5.

King William's Town —Mean Max. 84·8, Mean Min. 58, Mean of Month 71·4, Absol. Max. 103 on 24th, Absol. Min. 47·5 on the 17th, Monthly Range 55 5.

East London West.—Mean Max. 76 7, Mean Min. 62, Man of Month 69·4, Absol. Max. 88 on 11th, Absol. Min. 56 on 18th, Monthly Range 32.

Graham's Town (Bact. Inst)—Mean Max. 78 9, Mean Min. 54·9, Mean of Month 66·9, Absol. Max. 104 on 25th, Absol. Min. 41 on 18th, Monthly Range 63.

Bedford.—Mean Max. 83 3, Mean Min. 54, Mean of Month 68·6, Absol Max. 100 on 22nd and 25th, Absol. Min. 46 on 18th, Monthly Range 54.

Katberg Sanatorium.—Mean Max. 82·9, Mean Min. 54·2, Mean of Month 68 6, Absol. Max. 100 on 24th, Absol. Min. 46 on 18th, Monthly Range 54.

Stutterheim (Beste).—Mean Max. 78·5, Mean Min. 53·9, Mean of Month 66·2, Absol. Max. 100 on 24th, Absol. Min. 44 on 18th, Monthly Range 56.

Port Alfred.—Mean Max. 76·4, Mean Min 60·8, Mean of Month 68·6, Absol. Max. 90 on 25th, Absol. Min. 54 on 14th and 18th, Monthly Range 36.

Rietfontein.—Mean Max. 88·5, Mean Min. 54 6, Mean of Month 69, Absol. Max. 93 on 8th, Absol. Min. 44·8 on 5th, Monthly Range 48 2.

Aliwal North.—Mean Max. 84·8, Mean Min. 55·8, Mean of Month 70·3, Absol. Max. 95 on 8th, Absol. Min. 47 on 5th, Monthly Range 48.

Doornkop.—Mean Max. 81·3, Mean Min. 52·9, Mean of Month 67·1, Absol. Max. 95 on 8th, Absol. Min. 45 on 18th, Monthly Range 50.

Umtata.—Mean Max. 79 3, Mean Min. 58 4, Mean of Month 68·8, Absol. Max. 97 on 8th, Absol. Min. 49 on 18th, Monthly Range 48.

Main.—Mean Max. 78, Mean Min. 55·5, Mean of Month 66·8, Absol. Max. 100 on 8th, Absol. Min. 47 on 18th, Monthly Range 53.

Kilrush.—Mean Max. 69, Mean Min. 50·6, Mean of Month 59·8, Absol. Max. 82 on 9th, Absol. Min. 43 on 18th, Monthly Range 39.

Mohalies Hoek Mean Max. 83 61, Mean Min. 51·2, Mean of Month 67·4, Absol Max. 95 on 9th, Absol. Min. 41 on 18th, Monthly Range 54.

Teyateyaneng.—Mean Max. 83·2, Mean Min. 52·3, Mean of Month 67·8, Absol. Max. 95 on 9th and 11th, Absol. Min. 45 on 7th, 8th and 30th, Monthly Range 50.

Quthing.—Mean Max. 90 7, Mean Min. 54·2, Mean of Month 72 4, Absol. Max. 101 on 9th, Absol. Min. 47 on 6th and 18th, Monthly Range 54.

Geelong.—Mean Max. 87·1, Mean Min. 65·4, Mean of Month 76·2, Absol. Max. 96 on 13th and 16th, Absol. Min. 60 on 8th, Monthly Range 36.

Salisbury —Mean Max. 76 3. Mean Min. 60·9, Mean of Month 68·6, Absol. Max. 82·4 on 27th, Absol. Min. 58 on 16th, Monthly Range 24·4.

Hope Fountain.—Mean Max. 78·8, Mean Min. 60, Mean of Month 69·4, Absol. Max. 85·5 on 12th, Absol. Min. 58·2 on 8th, Monthly Range 32 3.

THE

Agricultural Journal.

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EDITORIAL NOTES.

We have, in times past, noticed how surprised growers of leguminous crops such as peas, beans, and clover sorts, have been that the application of nitrogenous manure had very little effect and was often even fatal to clover. And yet, more puzzling still, such crops always left the soil richer in nitrogen than they found it—this is the reason why clover is such a good preparation for wheat or other cereal crops. The perplexed cultivator was unaware that the plants drew the larger part of their nitrogen from that of the atmosphere. In this connection it is useful to note that lucerne, as well as being of great value as a feeding stuff, is of much importance as a fertiliser. This has been very prominently brought forward by experimental culture at the Wyoming Agricultural Station, U.S., proving that lucerne largely increases the nitrogen in the soil. It therefore follows that in arid regions lucerne crops must be especially valuable for improving the tilth and for destroying the weeds by crowding them out. In view of weeds a timid lucerne planter will sometimes grow his lucerne in furrows so that he can get between, slash away the weeds and rake them out. But for those who grow on a large scale, as our Oudtshoorn friends can testify, broadcast sowing is best for every reason, and if weeds be prolific they can, by close cropping the lucerne till it is thoroughly well rooted, be choked out or placed *hors de combat.* Where weeds are likely to be very troublesome sow the lucerne closer. Wyoming proved that land, where lucerne had been cultivated for five years, produced more wheat, oats and potatoes than land which had previously grown potatoes and grain, the increase per acre being estimated at 42s. for wheat and 37s. for other crops. The increased yield and value were moreover produced without manure. In some experiments a ton of lucerne was found to contain 44 lbs. of nitrogen, 8 lbs. of phosphoric acid, 50 lbs. of potash and 40 lbs. of lime. Thus nobody need be in fear about the quality of the soil in which lucerne has run its profitable course.

The man who visits our office the most is the embryonic poultry-breeder. Somehow there is an impression abroad that keeping poultry for commercial purposes in the suburbs of Cape Town and other large towns is attended by abnormal risks from pests and diseases. But our own roosts are full every night of healthy birds who do an honest day's work of scratching, pecking, laying and hatching, without turning a feather, and sleep soundly from sunset to cockcrow. Why should not all other roosting communities do likewise? If proper conditions are observed we know of no just cause or impediment. We do know of some people who spend money and labour earnestly procuring first-class fowls and putting up the most modern pens and fixings. They start with a large stock of excellent birds of the best breeds for laying purposes, but, from the moment they begin to run about in their new home, retrogression instead of progression seems to be the order of the day among the poultry. They seem to dwindle in size and to be hungry when they should be saucy about food. This is partly because the ground in which they run is almost devoid of edible vegetation, weeds (for seeds), insects, and other minute life, and because they are worried by vermin. The first care of the poultry-keeper should be the provision of plenty of productive scratching ground, a fair amount of shade from bushes and trees, and perfect cleanliness in the fowl-house and its surroundings. Of course the latter is as important as anything else. When the breeder can afford it he should have the poultry-house lathed and plastered smoothly on the inside, and as the smooth surface of the walls provides no crevices for concealment, frequent applications of whitewash will prevent vermin from attaching themselves to the house.

Winter will soon be upon us, and as such a house is warm in winter and cool in summer now is the time to begin your good fowl-house. If laths and plaster be too expensive then get the next best thing from the merchant who supplies house builders' material, namely, some sheets of tarred paper or felt, which is manufactured expressly for building purposes, and line the fowl-house with it. It is, of course, cheap, but it is effective against the pests. Frequent coatings of tar should be applied to this paper, tar being very distasteful to vermin and healthful for fowls. One word more: let everything in your fowl-house be new. Old nests and nesting-boxes are probably the abiding places of lice and vermin and should be burned. There are a few notes under Queries and Replies at page 447 of this journal which it will be well for poultry-keepers to observe

It often astonishes us to see the amount of energy and enthusiasm that a small coloured boy exerts in driving cows home to be milked, and the use he is allowed to make of his peculiar vernacular accompanied by a flexible sjambok. If there should be a few dogs about, it is considered good practice and training for them to round up the home-going cows. Or perhaps the cows will be entirely neglected by their drover and allowed to wend their way unguided through roads traversed by many vehicles and passengers, in and out of which the milkers have to dodge like the proverbial dog in the fair. The best bred animals in the world will become dry and useless under rough treatment. Therefore be kind and gentle to your milch cows. It is positively profitable to pet a cow as you would pet your wife or child, your cat or your canary. The least violence to a milker decreases the milk, and so does every bark of a dog and every yelp of a larky boy, not to mention the sjambok. Gentle methods prevail on a well-kept and successful dairy farm. The cow knows exactly what she has to do, and her goings to and fro, her down-squattings and her up-risings will, of her own volition, be as regular as the rising and setting of things terrestrial—all her master or her mistress has to do is to wait upon her and treat her as a valuable member of the family. Let her feed while you milk her; even from this habit you will gain increased milk through the anticipation which the animal enjoys of the combined delights of a nice little nibble and the attentions of the milkmaid.

If breeders of stock would reap the reward that should be forthcoming for such an industry as theirs they must improve their stock, though it be at the cost of a few big cheques. There is no reason why South African stock-breeders should not be as successful as Australians and Americans, but it can be only through buying good pedigree bulls. The report of a sale of Aberdeen-Angus cattle which we publish at page 468 shows prices for cattle that at first sight seem enormous to some of us. It must, however, be remembered that the prices obtained by stud-owners for the use of stud animals and for the progeny of their expensive sires are also very high, according to the pedigree and quality of the sire, so that the prices paid for the bulls will not seem so extraordinary after all. Suppose that even a fancy price were paid for a sire, look at the value of the young stock and the prices obtained for the services of the high-born parent, and then his purchase price appears but a trifle. A good sire ought, in two seasons, to pay for his purchase price by his stud service alone. Then supposing that you have another stud season out of him, which is thus nearly all profit, he is at the end of that time probably still absolutely fit for sale, and having by his progeny proved his quality, he may fetch in the market as a *tried* high-class animal more than he cost at the outset as a speculation. If the stud-owner is also a breeder on his own account he is the man who makes the most money, and his first cost is spread over the young stock and the profits from the services of the sire, so that it is relatively a really small affair. Now there can be no doubt that the opportunity to get possession of cattle of first-class breed would be eagerly seized by many stock-breeders within our borders. Throughout South Africa there are numerous well-to-do farmers who, if the chance were given them to inspect high-priced animals of good pedigree landed at Cape Town, Port Elizabeth or East London, would willingly take the trip and pay the price. For the enterprising breeder oversea there is a good thing to be done in this way, if he will venture, gradually at first if he chooses, to approach our markets with his samples. To him we would offer excuse for any timidity shown by our farmers in reference to sending orders abroad "on spec.," for they have been so beset by diseases and "political" troubles that "wacht een beetje" seems to have become a kind of industrial creed for the nonce. Still we think they will yield readily to temptation if presented in the way suggested.

Mr. Willcocks catches it warm in some of the English newspapers in reference to his remarks upon the purchase of machinery for the irrigation project in South Africa which he advocates. If the scheme is carried out the expenditure will be enormous, for, according to the expert, a disbursement of as much as £30,000,000 will be requisite, a large proportion of it being for labour-saving and agricultural machinery. Of course British manufacturers are on the *qui vive* for orders, and their chagrin may be easily imagined when Mr. Willcocks makes the suggestion that we may look to American workshops for the principal portion of the labour-saving machinery. We think it may be fairly contended that the manufacturers of the Empire can as easily supply all that is required as our American competitors.

That excellent journal the *Field* has a reference to the future of our sheep-breeding industry when peace once more reigns in the land. It predicts the raising of the industry to a higher standard, but the prediction is qualified by the propounding of a problem *re* scab eradication. It seems that an Australian, who has been over a wide expanse of South Africa, regards any attempt to improve the sheep stocks of the country or making the pursuit more remunerative as positively hopeless unless the scab plague is completely stamped out. Although the task is a formidable one and involves operations that might delay the process of restocking, it is undoubtedly the safest and perhaps the only possible course to ensure enduring success for our future flocks. Australia has had to undergo heroic measures in similar matters, and if ever we have to do and suffer as she has done her experience may be a guide, a stimulus, and a tonic.

Let all the States in South Africa combine with £20,000 apiece to exterminate the locusts. So says Mr. Willcocks in the portion of his report which we publish in this issue. His remarks under the head of "Locusts" are, generally, so interesting that we commend them to the earnest attention of the States and their peoples.

Mr. J. P. de Waal.

Just as we go to press the Agricultural Department has received a telegram from San Francisco, dated 8th inst., as follows:—"De Waal dead. Tramway accident." Need we say that the grief of everybody who knew this most genial friend and scholarly viticulturist is poignant and profound. Particulars of his life and work will be given in our next issue.

QUERIES AND REPLIES.

Maud's Wonder Forage Plant.

A correspondent at East London forwards a cutting from the *Cape Times* weekly of the 12th March last, headed "A New Fodder Plant"; and for the information and guidance of those who may feel interested in such matters we publish the gist of the reply sent by the Agricultural Department, viz.: "The Government Botanist reports that this plant (Maud's Wonder Forage Plant) is not botanically known, nor is it mentioned in the accurate and up-to-date bibliography of the United States Year-book of the Department of Agriculture, nor in any of the best United States Agricultural Journals.

Professor MacOwan states that he is inclined to suspect that the thing is nothing more than our old friend Teosinte [*Reana luxurians Dur.*], a very coarse harsh grass of Guatemala, which had its little day of exaggerated praise and sale for experimental trial in the early nineties, and has long ago dropped into oblivion. See what was said about it in December, 1892 (*Agricultural Journal*, Volume V, page 289), when it made its second appearance, not as Teosinte, its previously played-out trade name, but as 'Regina Alta.'"

Warts.

I have four young cattle, aged about eighteen months, upon which warts have appeared. One of the animals has nearly the whole of his head covered with them. Will you, through the medium of the *Journal*, kindly recommend the most effective cure.

G. C. BEDFORD.

With respect to warts on animals, the originating cause of these growths on the skin is not very well understood. They are abnormal growths of the papillæ of the skin, and become so prevalent on young cattle on some farms at times, that one cannot help suspecting that there is something contagious connected with their spread. I have seen some young cattle with their heads, necks and forequarters literally covered with these warts, of various sizes, some singly, while others would occur in clusters. These young animals present a most unsightly appearance. While the numbers that are sometimes situated around the eye and mouth make it difficult for the affected animal to either see or eat.

It is marvellous also how rapidly these warts disappear, without treatment, generally when the animal is between two and three years old.

I do not know of any treatment except either burning them off with strong caustics, such as strong acetic acid, arsenic paste, or euphorbium milk, as it is called, or cutting them off with a knife or écraseur and searing the root with a hot iron, or sloughing them off by tying a strong fine thread firmly around their necks. If there are only a limited number, they can be very effectively removed by applying a paste made of Cooper's dipping powder. Take a sharp knife and pare off the outer hard crust of the warts until you can see the red vascular surface underneath; avoid making them bleed. Then slightly moisten a little Cooper's powder, making it into a paste, and paste this over the surface of the wart. Personally, I apply a little of the pure white arsenic in this manner, moistening my finger and laying on as much of the powder as will stick; one dressing is enough, if properly applied. The warts slough out, the wound or hole can then be dressed with a strong solution of bluestone, or if there is a little root remaining apply a little finely powdered bluestone. I would not recommend arsenic to be used in this manner on a large number of warts, absorption might take place through the broken surface and develop the physiological action of the arsenic. If they have a distinct neck they are easily taken off either by ligature or cut off and the root seared. On a large scale, I would recommend paring their surface and dressing them repeatedly with strong acetic acid. Where they are very prevalent I would recommend isolation of the affected, until we know something more about their originating cause.

A daily dressing of a mixture of equal parts of salicylic acid and glycerine is also recommended for small warts. D.H.

Poultry Breeding.

Will you kindly tell me whether you recommend the beginning of a poultry farm say in the suburbs of Cape Town or Port Elizabeth. I have not much capital, and other circumstances make me anxious to avoid any blunders at the outset if I can do so. Do you consider that poultry diseases in the suburbs of Cape Town are more prevalent than elsewhere? S.M.

We see no reason why the correspondent should not do well at poultry breeding in either of the places he mentions provided he observes the proper conditions of such an undertaking. We are not aware that poultry in the suburbs of Cape Town are more prone to disease than anywhere else. Nearly all disease is the result of carelessness and lack of knowledge. We would refer our correspondent to Editorial Notes in this issue, and to the following points:—

1. Do not inbreed.
2. When the poultry is confined supply them with what they can pick up when running at large; for example, gravel, lime, dust-bath, green stuff, etc.

3. Keep no hens over two years old, because after that age they will moult so late that the prospective profit is eaten before they begin to lay.
4. Select the best layers to breed from, and so secure a good laying strain.
5. Watch closely for the hens that do not lay and get rid of them at once.
6. Save the waste table scraps and all the kitchen waste, mix and give as a hot morning feed, taking care that it is not in a sloppy condition.
7. Do not give too much food.
8. Keep the hens busy by scattering straw about the poultry yard and throwing the grain feed into it.
9. Write to the Agricultural Department for up-to-date pamphlets on Poultry Keeping. EDITOR.

Disc Pulveriser.

Can you or any of your readers give me any information as to the work a Disc Pulveriser does on lucerne land? Will it kill the grass? When is the best time of the year to use it? G.

Will our readers please give the information.—EDITOR.

Mebos.

If any of our readers have had experience in the making of "Mebos," *i.e.*, apricots dried in a certain way so as to keep them in a moist condition, we should be glad to have the information for a correspondent.—EDITOR.

Piles in Ostrich Chicks.

Uniondale.

Can you give cause, treatment and cure for supposed piles in ostrich chicks?

T. CAIRNCROSS.

The cause of piles or the eversion of the mucous membrane lining the rectum, may be straining from severe purging after receiving a dose of purgative or vermifuge medicine. It may also arise from the opposite condition—straining on account of constipation. In the former case the everted membrane should be thoroughly cleaned. If there is much swelling the parts should be slightly scarified, then dressed with some olive or sweet oil, and carefully returned and pressed well forwards by the fingers. If it protrudes again immediately, a strong stitch should be taken closing the rectum for twelve hours; after which the stitch may be removed to allow of the rectum being emptied, the dressing and the stitch being renewed as long as necessary.

D. HUTCHEON.

AGRICULTURE.

Report on Irrigation in South Africa.

BY MR. W. WILLCOCKS, C.M.G., M.I.C.E.

(*Continued from page 397.*)

THE PRICE WHICH COULD BE PAID FOR PERENNIAL IRRIGATION.

From inquiries, observation, and comparison with other countries, I should say that in those parts of South Africa which lie below 1,000 feet above sea level, and are situated in the arid or semi-arid region, a rent of £2 per acre per annum could be easily paid for perennial irrigation anywhere near a railway. In the semi-arid regions between 1,000 and 2,500 feet a rent of £1 10s. could be paid. Where the ground is over 2,500 feet in height, a rent of £1 per acre per annum could be paid. Near cities and important centres a higher rent could be paid. Allowing for perennial irrigation in nine years out of ten on the whole area, and for perennial irrigation in years of drought on only half the area, I think that, with labour-saving machinery and a capable man to design and direct the works, the cost of providing perennial irrigation from reservoirs in South Africa would vary from £7 10s. to £15 per acre. As the selling value of an acre of land not provided with perennial irrigation varies from 2s. 6d. to £3 per acre, while the price of good land provided with perennial irrigation varies from £20 to £100 per acre, irrigation works might be undertaken without any misgiving. It is understood, of course, that perennial irrigation would be provided for none but the best land. No reasonable man would think of providing so costly a thing as water to any but the best land in South Africa.

THE ORANGE AND VAAL RIVERS.

The Orange and Vaal Rivers meet near Douglas to the south-west of Kimberley. The catchment basin of the Orange River is about 35,000 square miles, and of the Vaal River 65,000 square miles. The maximum flood discharge of the Orange must be over 200,000 cubic feet per second, and of the Vaal 80,000 cubic feet per second. The ordinary flood of the Orange River may be taken as 50,000 cubic feet per second, and of the Vaal 10,000 cubic feet per second. It will be evident that the rainfall in the basin of the Orange is considerably in excess of that in the basin of the Vaal, and that the hills are steeper. The Vaal is in flood from January to April, while the Orange is in flood from December to April. Storms produce temporary floods in the other parts of the year. The riversare at the lowest in August, September and October, when the discharge may fall to 50 cubic feet per second in a year of deficient rainfall. The Vaal has a bed width of some 400 feet and a depth of water in flood of 25 feet, the Orange has a bed width of 800 feet and depth ot water of 85 feet. The general slope of the Orange River may be taken as three feet per mile up-stream of Aliwal North, and four feet per mile down-stream of Aliwal. The slope of the Vaal may be taken as four feet per mile up-stream of Klerksdorp, and three feet per mile down-stream of Klerksdorp. Except in the neighbourhood of Barkly West the Vaal has more numerous rapids up-stream of Klerksdorp than what it has down-stream of Klerksdorp. The Orange River, on the contrary, has numerous rapids down-stream of Aliwal North and scarcely any up-stream.

The country traversed by the Orange River is rugged and mountainous, while that traversed by the Vaal is undulating and fertile. From its source to where it leaves the Orange River Colony the Vaal may be used everywhere for irrigation, while the Orange River can be utilised nowhere in the Orange River Colony, and not even in the Cape Colony until one has passed Colesberg and is half-way to Hopetown. I leave out of count the scattered patches of foreshore in the troughs of the rivers which any riparian owner can irrigate with works of very ordinary magnitude.

In contemplating irrigation works on these two rivers it is not necessary to complicate matters by having to provide for navigation. With the steep slopes and torrential floods which we have on these rivers navigation is out of the question.

From some point midway between Colesberg and Hopetown it would be possible to take out a canal on the left bank of the Orange River, which should be capable of irrigating an extensive tract of country. The canal would tail into the Orange River near Prieska. The fall would be 400 feet and the distance 150 miles. An overflow weir of some 60 feet in height, of the type of the Betwa weir, would be constructed along one of the solid dykes which traverse the river. This weir would be only a diversion weir, and the bed of the canal would be ten feet below its crest. The canal itself would follow the windings of a contour on a slope of two feet per mile, and fill every pan and depression it encountered. All the storage would be made in pans and valleys. In this way it would be possible to take water freely from the Orange River in flood, and by means of these pans to ensure perennial irrigation to extraordinarily large areas of land. A storage of 250,000 cubic feet of water would be needed for each acre of land to be perennially irrigated. With the aid of its flood waters the canal would be capable of irrigating double the area. The solid weirs would be cheap since they could be built in lime mortar, while the canals would be dear, as rock might be frequently encountered. It would therefore be true economy to construct numerous weirs and small canals. One weir and one grand canal would not be economical here as would be the case in India. Wherever rock was encountered it would be necessary to drop the bed of the canal some four or five feet, decrease the width and increase the slope. In this way, by taking advantage of every feature of the ground, many thousands of pounds would be saved.

A second 60 feet high weir might be constructed near Prieska, and a canal dug to the South of Kenhardt. The distance from Prieska to Kenhardt is 120 miles, and the fall, according to Mr. Gamble, is 650 feet. This canal might be led into the extensive pans South of Kenhardt and be employed in vale irrigation on a scale not dreamt of yet in South Africa. At this weir, flood embankments would be needed to keep the river within its banks. Advantage might be taken of this to provide flood or "vale" irrigation for the extensive flats near Prieska on both banks of the river and to add some 10 or 20,000 acres to the wheat area of the Colony.

A third 60 feet high weir might be constructed at Upington, and a canal dug into Bushman's Land south of Pella. The fall from Upington to Pella, according to Mr. Gamble, is 500 feet and the distance 200 miles. This canal would command an immense area of what, I am given to understand, is excellent land but quite waterless. Care would have to be taken in traversing the apparently low depression down which the Hartebeeste River runs. According to Mr. Gamble's levels, Kenhardt is 100 feet lower than Upington.

In the districts traversed by the last two canals, wheat is a winter crop as it is in Egypt, and it would be possible to irrigate directly without the aid of reservoirs. True, there would be only one crop per annum, but it would be an extraordinarily rich crop, sown on the rich alluvium of the Karroo, and matured with the muddy waters of the Orange flood.

All the poor whites in South Africa might be settled on these canals for many generations. In all questions connected with the Vaal and Orange Rivers, I am indebted to the extreme courtesy of Mr. Litchfield, who has spared no pains to place every kind of information at my disposal. For the knowledge of the country south of the Orange River, I am also indebted to Mr. Bain.

The Cape Colony Government might certainly employ a couple of strong brigades of engineers in thoroughly sifting the question of the utilisation of the Orange River. Fed from Basutoland, it is the most reliable river in South Africa; it carries rich fertilising water, and traverses healthy, rainless lands in its lower reaches, where we have left behind the high altitudes in which frost in winter is so much dreaded. Both banks of the river should be thoroughly examined; and in considering the projects the Government may rest assured of this fact, that every extra pound spent on the dams will result in the saving of ten pounds on the canals. Get the river water out of its trough and all will be easy. Leave the water in its trough and nothing can be done with it.

A hundred thousand acres of irrigated land on each of these canals would require a discharge of 600 cubic feet per second per canal, assuming that one cubic foot per second would suffice for 150 acres. With labour-saving machinery and weirs of the type of the Betwa River Weir, this irrigation should be provided at a cost of £5 per acre. A water rate of ten shillings per acre per annum would cover all expenses and pay five per cent. on the capital.

If a careful survey were made of the trough of the Orange River, which, I understand, has an average width of 1½ miles from Prieska westwards, while half a mile is amply sufficient for the full flood waterway of the river, it might be found that a series of stone spurs and obstructions would suffice for the reclamation of an average width of one mile of land along hundreds of miles of the river. Here there might be a possibility of creating at a very moderate expenditure some hundreds of thousands of acres of first-class land which would be capable of easy irrigation, and have a value of £25 per acre and upwards.

I have not met anybody who knows anything of the country to the north of the Orange River.

I now come to the Vaal River irrigation. Here we have conditions differing entirely from those on the Orange River. The country traversed by the Vaal lies generally at a high altitude, and direct flood irrigation would not be of much value. For any scheme for storage or irrigation up-stream of the junction of the Wilge River and the Vaal River near Grobelaar's Ford, it will be necessary to treat the Vaal like the Wilge or the Valsch in the north-eastern half of the Orange River Colony. The river and its tributaries are provided with many dykes, on which overflow storage dams of 30 and 40 feet in height might be built of masonry. Such dams would be provided with two good scouring sluices each, of the dimensions proposed for the Caledon River. Below the junction of the Wilge River with the Vaal, and up to Klerksdorp, where the pan formation may be said to begin, it would be found to be most economical, on the solid foundations which we have here, to build unsubmergible storage dams some 100 feet high of ferro concrete, and provide them with sufficient sluicing to pass the whole of the flood waters of the Vaal. Suitable sites would be found, I think, at Engelbrecht's Ford up-stream of Vereeniging, at Parys, and at Kromdraai down-stream of Klerksdorp. I am not sure whether a height of a hundred feet could be obtained, but if it could it should certainly be adopted. If the hills in the vicinity of the river would not allow a greater height than 60 feet, an overflow dam should be adopted with some five under-sluices. The canal should lead off with its bed some twenty feet above the bed of the river. This would suffice generally on the Vaal as far as Klerksdorp. The valley of the Vaal River lends itself perfectly for irrigation. The river falls at a rate of some three feet per mile, and as it would start with its water surface delivering flush irrigation, it would recede gradually from the river, and on a length of thirty or forty miles command as much land between itself and the river as it could irrigate. The soil in the vicinity of the Vaal River is, as a rule, well suited for irrigation. Such irrigation could be provided at an expenditure, I estimate, of £10 per acre, and a water rate of £1 per acre would pay all expenses and five per cent. on capital.

For the reach of the river between Klerksdorp and Kimberley I should propose diversion weirs or overflow dams on the dykes which traverse the river, of any height from 30 feet to 50 feet, for the sake of leading the Vaal River water out of its valley and getting it to command the lands to be irrigated. Here we have entered the pan formation, and Nature itself has provided the reservoirs for storing the water. There is much excellent land on the southern bank of the Vaal between Hoopstad and Kimberley, which would be commanded by such a canal. Under the heading of the south-western half of the Orange River Colony I have already given a very full description of "pan" irrigation. The northern bank of the Vaal River is as well suited for irrigation as the southern bank. The water of the Vaal River could be turned into the Hartz River at a high level and utilised for irrigation in the Cape Colony.

As the Orange and Vaal Rivers are both boundary streams between the Cape Colony, the Orange River Colony, and the Transvaal, it might save considerable trouble and ill-feeling in the future if the three Colonies were to settle their claims in the respective rivers, by the Cape Colony accepting the waters of the Orange River as its property; while the Transvaal and Orange River Colony divided the Vaal between themselves.

LIFT IRRIGATION, OR IRRIGATION WITH THE AID OF PUMPING.

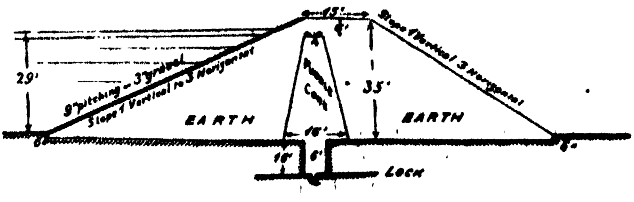
It will be noted that I have not spoken anywhere of irrigation by pumping. As irrigation in South Africa depends in nearly every case on reservoirs, it is as easy and more economical to provide flush irrigation. Where coal is cheap it might be profitable for individuals in well-favoured situations to employ pumps, but it certainly would not pay on any scale to first store water and then pump it. In Egypt, where the land is worth £50 per acre and coal costs £1 10s. per ton, it costs £2 10s. per acre to irrigate with a lift under 30 feet in height. No pumping is done at greater lifts as it is not considered profitable. Lifting water by windmills for irrigation may pay in town gardens, it will scarcely pay anywhere else.

LOCUSTS.

Locusts are one of the plagues of South Africa. If all the States would combine and devote annually some £20,000 each to the extermination of locusts, it should be possible to gradually exterminate this pest. Though the area of the country is large, still it is always being traversed by Kaffirs, Bushmen, shepherds and Colonials, and the land itself is so extraordinarily bare, that it should not be found very difficult to locate the locusts in their voetganger stage and destroy them. Midway between Bloemfontein and Kimberley, while riding with Major Beresford, of the South African Constabulary, at the foot of some low hills in the Karroo bush, I came across great numbers of the voetgangers. They were jet black and were very easily distinguished. Indeed, it appeared as though some giant had just walked over the veld and sprinkled it with great splashes of jet black ink. If I had been a Kaffir, and had known that a reward would be given for the location of locusts in this stage, it would have been a simple matter to go to the nearest migistrate and report the appearance of the voetgangers. A few men with washing soap and water and sprays could have killed many millions in a few hours. Some policy of the kind, steadily followed by all the Governments, would, of a surety, have an effect on the number of the locusts. A month later I saw a flight of locusts near Standerton. Once the locusts had taken wing, of course, nothing could be done to them, but their location when they had settled and laid eggs would lead to the destruction of voetgangers as soon as they had put in an appearance. In addition to the payment of rewards the States might have a paid staff of men, whose sole work would be the destruction of locusts. In ancient Egypt there must have been State employés of this kind, who did not, however, receive much remuneration, because, though there are scarcely any locusts in Egypt to-day, whenever a man has an ill-paid job, he says he is employed in killing locusts. It may have been the Egyptian solution of the poor white question.

DAMS AND WEIRS.

The most solid earthen dam I have seen in South Africa is the Queenstown reservoir dam. It has the following section:—

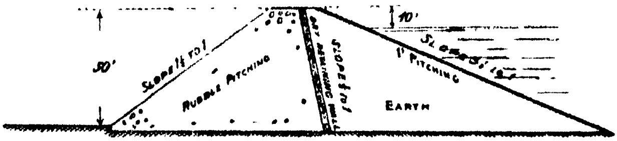

15'
4'
Slope 1 Vertical 3 Horizontal
29'
9" pitching – 3' gravel
Slope 1 Vertical to 3 Horizontal
35'
EARTH
EARTH
15'
10'
6'
LOCK

It will be noted that it is provided with a puddle core. The head of water is 29 feet.

The Houwater dam has similar slopes, but the top width is three feet. The height is 30 feet, and the depth of water 20 feet. This dam has no puddle core, but has been well trampled by animals during construction. Both dams look staunch and good.

Speaking generally, it seemed to me that the South African clay was not well suited for dams of great height. Indeed, I should hesitate to make any earthen dam more than 30 feet high in this country.

As stone is plentiful everywhere, I should strongly recommend rock and clay dams of the type given on page 53 of Schuyler's Reservoirs (New York, 1901). Such dams could be safely constructed up to 50 feet in height.



The largest stones should be on the down-stream side and the smallest on the up-stream side.

If such dams were to be constructed across the bed of a stream of any magnitude, and to be provided with spill channels, I should recommend the stonework being enveloped in strong galvanized wire netting, and exposed to one flood with the stones placed in the order recommended for the Caledon River weirs. The muddy waters would thoroughly consolidate the stones, and then the earth might, with advantage, be added in the following year.

If a dam is to be over fifty high in South Africa I should recommend masonry or ferro concrete. Ferro concrete is known as "Beton armee."

(*To be continued.*)

Military Farms.

We have sometimes to go a long way from home to find out what people are saying about us. For instance, we find the following very interesting article in the *Adelaide Observer*, South Australia:—

Mr. W. Bleloch, war correspondent of the *Morning Post*, has found time amid his martial duties to examine into the progress of two new departments which, with highly creditable foresight, have been established in the Transvaal. One of them is the department of military Government farms, organized under the supervision of Col. Morgan, Director of Supplies, for the purpose of providing the army with fresh vegetables and fodder; the other is the department of civil Government farms, under the control of Mr. Hamilton, Director of Civil Supplies. Writing of the former, Mr. Bleloch says:—"The farms under the direction of Col. Morgan are now of great extent, numbering nearly 70, with about 5,000 acres under cultivation. Originally these farms were cattle posts, selected within protected areas for the grazing of Government stock, and the work of cultivation began by the cattle guards planting a few acres with vegetables for their own use. Their manifest success in this led Col. Morgan to encourage and develop the idea. He employed Mr. S. B. Schlam, an Australian farmer, to direct the work, and as the scheme expanded the services of Mr. T. Hogg-Robertson, a Cambridgeshire farmer, were also secured. Mr. Schlam having left for Australia, the whole management is now in the hands of Mr. Hogg-Robertson. Each farm is managed by an overseer with a few white assistants. These are selected from among men of the irregular corps and the Yeomanry who have obtained their discharge after good service in the field. Under them there are some 3,000 natives and coolies who are paid from £1 to 30s. a month, with rations of mealie meal or rice, and occasionally some meat. The largest group of farms is near Pretoria. They stretch from Wonderboom Poort for some nine miles along the Aapies River, the area of land cultivated being nearly 2,000 acres. When I visited them nearly three weeks ago these farms showed a wealth and variety of production such as I had never seen before in the Transvaal. There were fields of magnificent cabbages; peas, beans, turnips, potatoes, and other vegetables were growing in quantities, proving more than sufficient to supply the local army. Besides these there were large areas under barley and oats. The barley was being cut green and sent in daily to freshen up the horses in the remount camps. One thousand bundles of 4 lb. each was estimated to be the average yield per acre. The oats were a magnificent crop, and when reaped will materially lessen the quantity of forage to be hauled over the railway from the coast. An experimental field of lucerne had been planted and was doing splendidly, the estimate of the yield being 6 tons per acre green and 4 tons dry." Special attention is paid to the production of lucerne, which is recognised as splendid fodder for horses, and although as yet no wheat has been put in, Mr. Robertson is convinced that this article, as well as oats and barley, will thrive in the Transvaal. Indeed, wheat was one of the principal crops of the "bywoner" class of Boers. At present large areas of mealies are being planted on lands above the level for irrigation; on the northern farms near Warmbath and Pietersburg large quantities of pineapples and bananas are growing, and besides the other ordinary crops good returns are looked for from the fruit gardens of these derelict farms. The profits in sight from all these operations are spoken of as large. From some farms produce to the value of £500 has been taken every week for the two months ending with October, but then cabbages are reckoned as being worth 9d. to 1s. 6d. each. The produce now raised is more than enough to supply the army, and the surplus is being used to fatten Government cattle.

Of the civil Government farms it is stated that the controlling department was originally known as the cattle preservation department, its object being to assist private owners of stock in procuring produce for the winter months. Later, as was also the case with the military farms, suitable areas of land were commandeered on which the cattle were run, and it soon became evident that it would be a useful thing in every way if the oxen were used in ploughing some of the lands formerly under cultivation and now lying desolate. The owners of these farms were mostly still on commando or were prisoners of war. Seed and implements were obtained, and a vigorous commencement of cultivation was made in the early months of this year. The results have been similar and equally successful to those of the military farms just described. One of the principal crops is oat-hay, and a harvest estimated to yield one million bundles is now being reaped. The yield is from 1,000 to 1,800 bundles per acre, the value at present rates being 60s. per hundred bundles. The organization is much the same as that of the military farms, with this difference, however, that special consideration is being given to the possible eventual settlement of the men employed as farmers in the new colonies. Wherever possible, the farms are taken up in groups of three or four, with one principal overseer over the group and a number of assistants. The chief overseer as a rule has had actual experience of colonial farming, and the men employed have all done active service in the field, with the exception of a few surrendered burghers who are employed on account of their local experience. The men are paid a moderate salary and are supplied with rations as repayment. Besid[illegible]n for their participation in the profits is being considered. [illegible]tment is besieged with applicants for these positions, mostly men of the Yeomanry and irregular corps; consequentl[illegible]lendid lot have been selected, and the department is succeeding in training a valuable body of practical British farmers, who will be available when the land settlement takes place. Many of them have considerable capital of their own. The working of the farms has been facilitated by an arrangement with the military, which has proved mutually advantageous.

Transport oxen in poor condition through continuous trekking have been lent to the civil department and used in light farm work until they have regained strength, when they are sent back to convoy work again. Lately the supply of oxen has been running short, and the importation of fresh stock from the Cape Colony and Natal is being considered, and for next season a supply of steam ploughs will probably be ordered. Large owners of land, such as Lewis and Marks, are offering the use of their lands for nothing to the department, being quite satisfied that the cultivation will improve rather than deteriorate their properties, so that at present there is unlimited scope for expansion. The general management of the farming organization is under Mr. Hamilton, Chief Director of Civil Supplies, formerly in the 49th Company Imperial Yeomanry, and the actual management is in the hands of Mr. D. W. Bruce, a Johannesburg Uitlander, at one time of the Border Horse, and a member of a Scotch family noted as breeders of shorthorns.

The India-Rubber Industry in Africa.

Present State and Prospects.

Les Plantes à Caoutchouc et leur Culture, par le Prof. Dr. O. Warburg.—Traduction complétée et annotée par J. Vilbouchevitch. 8vo. pp. 323. 26 figures. Paris 1902.

The Colony of the Cape of Good Hope lies a little beyond the zone of profitable culture of the plants producing the india-rubber of commerce, unless indeed new investigations into the capabilities of the latex of the arborescent *Euphorbiæ* suggest some means of solidifying the caoutchouc it contains. Still, the Colony is now so linked in many ways to tropical British Africa that we have an interest in all that makes for progress there. The volume whose title is given above collects all the scattered literature on the subject, systematizes the various researches of travellers, cultivators and chemists, and enables the pioneers who are desirous of making trial of this new staple to start upon the foundation of an up-to-date experience. Prof. Dr. Warburg, the author, is the editor of the valuable serial *Der Tropfenpflanzer*, and the translator, M. J. Vilbouchevitch, has recently established a review under the title of *Journal d'Agriculture Tropicale*. For us Britons of the Cape it is a little unlucky that an English edition of the volume on india-rubber culture has not formed part of the design. But no doubt those whom the subject most nearly concerns will not find much difficulty in getting from the book all they require. The French translation is almost a new work, so large and important are the additions made to the original. The editor has subjoined nearly three hundred annotations and about twenty new illustrations besides a capital series of indexes. It is a pleasure to handle a volume evidencing upon every page tokens of a conscientious care in the collation and appraisement of a vast number of separate memoirs. We venture to take over with a thankful appreciation the substance of a few pages from the section on African Rubber, with reference to the genera *Kickxia* and *Landolphia*, seeing that they furnish answers to many enquiries made of this Department by cultivators in Rhodesia and beyond; queries to which it has not been possible to give exact and complete reply.

Not long ago, the genus *Landolphia* furnished the whole of the African rubber, or at least people thought so; but recently other plants have been laid under contribution from very varied localities.

1. *Ficus Vogelii* Moq.—This species of fig, called "abba" on the Gold Coast, occurs there, at Cape Palmas, and on the Ivory Coast. Much trouble has been taken with it to obtain a good rubber. Schlechter, the most recent observer who has studied the plant in its native home, avers that of all the *Ficus* species in Africa, this is the only one furnishing a product which deserves the name of rubber. It is, however, less elastic than good sorts from *Landolphia* and *Kickxia*. Possibly it may be the source of the material known in commerce as "Accra Paste," a rubber of little value, fetching in the Hamburg market from 10d. to 1s. 6d. per kilo. of 2⅕ lbs. There may be some *Ficus* species of value eastward. It is possible that *Ficus Holstii* Warb. of Kilimanjaro and Usambara may be found profitable, but the result of the cultivation of the tree in the former district must be awaited before certainty is attained. Schlechter reports a *Ficus* growing in marshy places in the hinterland behind Inhambane, full of latex which coagulates at once and spontaneously, but unfortunately the product appears to be of a waxy consistence. On the whole it may be said that the latex of *Ficus* seems to be very impure and to contain much resin along with the rubber. Practical trials only can determine the extent to which this product, spite of its defects, can be rendered available.

2. *Kickxia spp.* The Lagos "silk-rubber," much appreciated in Europe, and valued at 5s. 6d. per kilo., has been exported from that place since 1894 only, but it seems to have been known on the Gold Coast from 1883. In 1897 the quantity exported from Lagos amounted to 2,229 tons. The previous year it had been 3,242 tons. The exact identification of the plant producing it has been the subject of interminable discussions. Until quite recently the *Kickxia africana* Bth. from the Cameroons was supposed to be its source, and many enquiries were made for it with a view of attempting its culture. However, Dr. Henriques recently analysed a specimen of the latex of this species and Dr. Traun another sample in Hamburg, and both declared it contained no true rubber, was in itself useless, and only capable of serving as an adulterant to the superior *Landolphia* rubber. The same verdict was pronounced after trial by Girard, and by Dr. Preuss also, working actually at the Cameroons. There

seems then to be unanimity as to the worthlessness of *Kickxi africana*, but the observers are far from agreement on the identification of the really useful species. Preuss concludes that the species giving the Cameroons-rubber is distinct, and names it *Kickxia elastica*; also that one furnishing Lagos "silk-rubber" and that collected on the lower Congo make respectively a second and third species. There may also be another *Kickxia* in Liberia. The Cameroons plant and the Lagos species have been put under cultivation on the large scale at Moliwe in the former district, as a result of Schlechter's Congo mission of enquiry. From the above it will appear that a good deal more certainty must be attained as to the precise species producing *Kickxia* rubber before cultivators in British East Africa can venture to introduce one or more sorts from the West Coast as a commercial venture.

According to general reports, which however require specializing, there exist several rubber-producing trees in Rhodesia, a *Carpodinus* or *Clitandra* in the north-west, some *Landolphias* north-eastward. Other producers are found in the valley of the Sabi River and along the Zambezi.

3. The various species of *Landolphia* are the principal sources of rubber from Africa. *L. Comoriensis*, with its variety *florida*, is the one extending over the largest geographical area. It is found from the Senegal to Angola, and from the Comoro Islands and Mozambique up to British East Africa. The statements made by travellers respecting the value of its product are very conflicting. Soyaux, Monteiro, Merlon, Speke and Grant say it is of inferior quality. Stuhlmann denies that its latex contains any rubber at all. Preuss states that in 1897 he obtained from it a rubber of good quality. Chevalier says that the coagulum is at first elastic, but after twenty-four hours it is converted by drying out into a brittle resin. It is possible therefore that the authors who admit the value of the *florida* product have not pursued their experiments for a sufficiently long time, or perhaps there has been some confusion in the species. But the *Landolphias* of most interest to South Africa in its wider sense are *L. Kirkii*, *L. Delagvensis* and *L. Capensis*. Of these the two former give a rubber of excellent quality. The latex coagulates immediately of itself, and the collector has only to roll it up into balls, some using a bit of rubber as a kernel to begin upon, and others employing for the purpose a bit of stick. As might be expected, the natives have not been slow to take advantage of the buyer and introduce into the balls foreign bodies to increase the weight. To such an extent had this practice been carried, that in January 1898 orders were issued by the authorities of German East Africa that no rubber was to be put on the market without each lump being cut in two, an ordinance which had the immediate effect of improving greatly the average quality of the rubbers of the district.

The industry of cultivating rubber plants for their regular exploitation during a term of years is as yet in its infancy, and requires to be taken up in East Africa with more serious intention than has yet been done. The problem as far as we are concerned is one for enterprising men in Rhodesia and probably parts of Natal and Zululand. Whoever is interested in the matter should carefully study the information collected in Dr. Warburg's interesting volume, and particularly the annotations by which M. Vilbouchevitch has brought the account precisely up to current dates.

HORTICULTURE.

Practical Orchard Work at the Cape.

(Continued from page 413.)

Thus the peach, the apricot, the apple and the pear, each require a slightly modified use of the knife, and this portion of the art—pruning properly so called, as distinct from the first shaping that has been here described, will be dealt with in another chapter. It is easy to recognise in many fruit gardens, all over the country, the result either of entire ignorance of the art of tree-shaping, or of several years' neglect followed by a spurt of action with the saw and the knife. One often sees a clump of apple trees which have been duly planted and cut back, perfectly correctly, knee high or less, to four or five laterals. Then something has occurred to interrupt the care of the fruit-patch for a few seasons. The laterals have grown out and upwards into great boughs as thick as one's wrist. Anon comes repentance with the saw, and cuts them back shoulder-high, making a huge wound which will take years to callus over. A great crop of shoots rises from the dormant buds below the section, and the head of the tree above the post-like branches thickens up into a dense bush of barren wood with here and there a strong leader struggling outwards to air and light. Never having been stopped back they have no fruiting spurs, and blossom only on the last year's growth at the very top. In due time there appears on each of these flexible rods a bunch of apples jammed up against each other to get space to grow, and bobbing round in the wind. This is truly how not to do it. These are the places where *Schizoneura* or woolly blight, and *Selandria*, the pear-slug, most do congregate, and establish nests of infection to destroy neighbours' orchards for miles around. Indeed it would not be difficult to argue that if it be a sin and shame for a man by ignorance or neglect to fail in duly caring for his domestic animals, and if the law can be invoked to make him treat these dumb children of the Almighty properly, it is proportionately fitting that proper knowledge and due care should be enforced upon every man in the treatment of his fruit trees. It is asked "Shall not a man do what he will with his own ?" the answer is, Certainly not; the law prevents him from doing very many things that either offend against the conscience or create a nuisance to his neighbours, and that latter malfeasance is exactly what many orchards here and there are doing at present. They are becoming hot-beds of insect and fungous pests which radiate away from their central home in all directions, and thus ignorance of cultural methods and the habit of letting things slide may render a man's fruit garden a curse to his neighbourhood. If he plants nothing, there is nothing to be said. If he plants trees, he is morally bound to care for them so adequately as to prevent their being mischievous to others, or else, by some such law as that which the Government proposed for acceptance in 1895, his neighbours should be empowered to make him.

39. It may be well to hear what successful fruit-growers in other countries say as to this fruit-tree shaping :—

1. "All deciduous fruit trees in this country be cut back after planting to within twelve inches of the ground. I should prefer a head within six inches of the ground. Among my early plantings I can show trees with a clean trunk four to five feet high, and I keep a few of these as monuments of my ignorance. The rest I shall cut down and grub out. Leave three or four buds at the top of the tree, and don't worry if the first year some small branchlets come out all along the trunk. They will help to shade your tree, and you may have to use some of them to balance the head next spring. As a rule your tree will not need the knife the first summer, and while shading the tree from sun-scald is wise, cutting low will generally give foliage to protect it amply."

2. "The top of the tree directly after planting out should be cut back to, say, fifteen inches above the ground. Let three buds grow at the top; three limbs are better than four or five. When twigs start out a little way below, pinch the terminal out and stop them. They then put out a few leaves and shade the trunk. In the following winter-pruning season cut off the three branches, leaving them about twelve inches long from the trunk. Allow each of them to send out two shoots, pinching back all others as soon as they start out as twigs. At next winter's pruning, the third year from the bud, cut off these six branches to eighteen inches in length. Each of these six is allowed to put out two shoots and the others are pinched back. The next year the tree has twelve branches, and has assumed a goblet form and is symmetrical, if care has been taken to pinch back all the twigs except those encouraged to grow."

3. "The best method to secure a tree with a low head is to cut the transplant off, not less than sixteen inches from the ground. Allow a few of the healthiest buds near the top to grow, taking

care the head is evenly balanced. It is best that they be distanced a little, not all springing from close to the top. All stuff that comes out below these may be left to grow a few inches, and then must be pinched out at the bud, allowing the bunch of foliage to remain to protect the trunk till the head is large enough to do that office. Then the trunk is cleared off bare. Allow the shoots forming the head to grow uninterruptedly all through the first season. The following winter cut them back to ten or twelve inches, just above a series of strong, healthy buds. If the sort of tree is an upright grower, cut to an outside bud; if it has a spreading habit, cut to an inside bud. The second season, allow two shoots to start from each one of the parent branches, and treat as before. By the third year you will have got a handsome symmetrical tree, and your after pruning is meant to keep it so."

So much for the practical advice of three practical men given in a country which of all others is most closely like our own in climatic conditions.

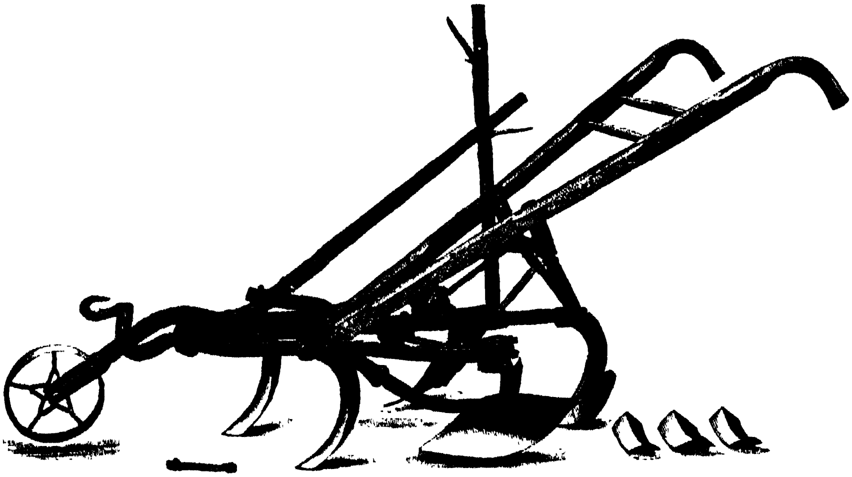
40. The modern orchard does not, like the Garden of Eden, cultivate itself. It demands a full share of the attention lavished upon cereal crops. The condition of openness and aëration with free passage of moisture through it and away has to be maintained. Where the area set out to fruit trees is very large, as in California, the plough and harrow are the implements greatly relied on for bringing the tilth to a finely pulverized state. Their use involves considerable difficulty in working among the trees, and here, where we set out our trees as close as possible, they are not likely to come into vogue. Our vineyards are often worked with the spade, and our conservatism may perhaps make us adhere to that method till we learn to employ the "cultivator" altogether. This excellent tool is quite competent to cut up the soil to a depth of eight or ten inches, with the assistance of a steady mule. Its special advantage is that its chisel-shaped teeth open the soil thoroughly without materially disturbing its general evenness, thus avoiding the unhandiness of the plough furrows, all of which have to be turned back again and worked to a level with the harrow. The whole of the ground between and among the trees must be kept in an open, worked condition, not only because it would otherwise harbour weeds and other interlopers which would night and day draw from the soil that which of right belongs to the trees, but for another and more important reason An open pulverulent tilth at the surface is the best preventive of evaporation from the underlayers in which the roots lie and perform their functions. As soon as a hard continuous surface-crust is formed, as, for instance, by drying out after irrigation, or after a beating rain, the uninterrupted capillary attraction exerted by the interstices of the soil-particles draws the moisture of the lower strata up to the heated crust, where it evaporates as fast as transmitted. It is therefore not long before the feeding-bed of the roots under such surface-crust is far too dry for their proper function, the growth of root-hairs ceases, and the trees begin

to show signs of flagging. Unfortunately the habit of many growers is to endeavour to set things right solely by running in an abundant irrigation and practically flooding the root-bed. As the water gets slowly away by percolation, most of it is evaporated from the surface and the crust reproduced, with the inevitable result of the same capillary rising of the very water just administered and its dissipation into the air. There is therefore a pernicious alternation of a fast and a feast forced upon the roots. The true remedy consists in interposing a loose, powdery or fibrous stratum several inches thick between the layers of soil in which the roots live and perform their functions and the external air, ever greedy of moisture.

41. Now there are two ways of doing this. One is of limited application, although it answers perfectly. It consists in covering the soil round a tree or plant with a layer of short broken straw or waste stable fodder. Gardeners know this plan of old, and call it "mulching." Under it, however sun-smitten and dry it may become, the soil is always more or less moist, never cakes into a crust, and never robs the water content of the root-stratum. In fact, loss of moisture through the capillarity of the interstices between the particles of the soil is completely stopped by these tubes (for such they practically are), never reaching the free air at all. Some will take it for granted, off-hand, that the preservative effect of the straw mulch is due only to its shadowing the soil from the rays of the sun; but careful experiments have completely disproved such supposition. About one-fourth only of the total effect is due to the mulch preventing insolation; the rest is due to its stopping the capillary withdrawal of the soil's moisture-content at a point short of the evaporating surface. If then it were possible to mulch completely the surface of an orchard or vineyard in this manner, there would rarely, if ever, be so complete a drying out of the feeding ground of the roots as to cause flagging and wilting of the foliage. But the method is in a general way only applicable on the small scale, as an artifice of the skilled gardener in his very restricted area. The efforts made to put it in practice in Californian orchards and vineyards have been limited through the extreme danger of destruction by fire which a large stratum of inflammable mulching material must always threaten. Still, cases are reported where it is in use on hill slope cultivation, where the chances of a disastrous wash-away are to be reckoned with, and it has proved quite successful for the double purpose.

42. Now just what the gardener in a small way over a few square yards can accomplish with a mulch of straw-refuse, the farmer can effect nearly as perfectly by making a mulch of his own powdery soil. If the top tilth is constantly kept broken up into fragments and never allowed to skin over into a close crust, it will almost as effectually check loss of deep-seated moisture by capillarity as would a mulch of straw-yard sweepings. This, then, is the main reason

why in all modern orcharding on the large scale, the cultivator* is kept constantly going in the intervals between the rows of trees. Its eager teeth, like crooked chisels, cut into the soil some three or four inches deep, and being chamfered off laterally, the little broken lumps slip away sideways and lie atop of each other loosely. It goes without saying that the passage of the sharp tines ever and anon through the happy home of annual surface weeds cut them off past recovery. The land becomes perfectly clean, like one of our vineyards, well kept at the cost of perpetual hoeing. Only such few weeds, as by reason of a perennial creeping root can survive and start again after being chopped up, will require hand-pulling. And thus by use of the interchangeable implements carried by the cultivator, a man may coulter up every square yard of his orchard into a loose protective earth-mulch, and even rake it mechanically to the smooth porous evenness seldom seen outside a garden parterre.



43. Seeing that the inevitable result of surface irrigation is to produce a close crust on the surface wetted and subsequently dried, it will follow that whoever irrigates must thus break up his top tilth into a mulch layer. Nothing is more strenuously insisted on by the most recent writers on fruit-culture, men, be it remembered, who are speaking of their own practice upon farms of an extent we have not yet begun to dream of. And what is more, the advice is acted on everywhere with more or less completeness. No better test of what cultivation a proprietor intends his land shall have, can be obtained, than that which is furnished by the particulars of the contract he makes with a temporary tenant holding the place in his absence.

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* The cut is kindly lent by Messrs. Lloyds & Co., Burg Street, Cape Town, the agents for the implement.

Wickson in his *Californian Fruits* specifies one such agreement, giving names of the parties concerned and the date. It is as follows: "Contract price per acre for young orchard on gravelly loam, \$12.50, comprising—First: Ploughing away from the trees and harrowing to follow. Second: Ploughing towards trees and harrowing to follow. Ten summer workings with cultivator. Three workings with shallow cultivator or weed-cutter. Five hand-hoeings around the trees. This contract intends the most perfect and complete working of the soil, and specifies the above in order that there may be no difference of opinion between owner and contractor."

44. It is also stated that in lands infested with "morning glory," a weed which is perhaps as troublesome as our Indian twitch, the rate is higher, and *weekly* workings with the cultivator are expressly stipulated.

TOP DRESSING—THE MODE OF MANURING ORCHARDS.

45. In carrying out the perfect cultivation which is the basis of modern fruit culture, there is abundant scope for private judgment. With one person, winter ploughing and harrowing for the heavier part of the task, followed by the cultivator in one or other of its forms all through the summer, will be preferred, especially where the soil is apt to compact itself. In lighter lands the cultivator alone, kept going off and on all the year around, will give the result required with less costly labour. And in performing these duties comes the opportunity for whatever occasional top-dressing the soil may demand. That particular form of manuring, subsequent to whatever has been done during the first trenching up, is the proper way of keeping an orchard in heart and restoring the materials taken out by the trees for their substance and their fruit. It must not be done by guesswork, or simply from the suggestions in the flaming advertisements of this and that firm's patent manures. It is necessary to find out what constituent of the soil is but poorly represented, and to keep this one in mind in future additions. At the Cape it may truly be said that the great and universal deficiency is phosphates. To the want of phosphates is due lamziekte of our cattle and sheep. They positively, on some land, cannot find in the herbage enough lime-phosphate or bone-earth to make their bones strong enough to carry their weight. Also in many corn lands there is now left the merest trace of phosphates, and the consequent weakened condition of the crop lays it open to destruction by fungus pests which would have been far less damaging to a crop in vigorous health. In many soils, lime is the great deficiency. We bring this needful building material from far, or are driven to use clay in place of it—sure proof of our lack of lime. In others potash is the special plant-food scantily furnished. Thus every man has to find out the weak point in the soil he cultivates before he can apply a rational remedy. We have given a list of the elements essential to plant-growth. All these must be had, although in very different

proportions. Some are present in all soils, even in the most barren. Hence it is fair to say that fertilizing consists in fetching up to par some one or all of these four elements, viz., nitrogen, potash, phosphorus in the form of phosphates, and lime. The best way to convince ourselves that the orchard soil must have them, is to take the ash of our common fruits and find out by analysis what mineral constituents are found therein, and how much of each. Every fraction of those constituents has been got out of the soil, and the practical outcome of manuring consists in giving them back again in such form that the plant can readily take them up. This table will make the matter clear.

	Potash.	Lime.	Magnesia.	Iron.	Phosphorus or Phosph. acid.	Sulphur or Sulph. acid.
Apple	35·68	4·08	8·75	1·40	13·59	6·09
Pear	54·69	7·98	8·75	1·04	15·30	5·69
Peach	74·46	2·64	6·29	·58	16·02	trace
Plum	59·21	10·04	5·46	3·20	15·10	3·83
Grape	63·14	9·05	3·97	·06	10·42	5·61

The above are percentage amounts. Those of soda and silica are omitted, seeing that these substances, although present, are not plant-food; nor does the table contain estimates of nitrogen or carbohydrates, for these substances are burnt off in the production of the ash. The woody substance of the trees themselves contains exactly the same elements. That of the apple-tree, for example, contains—

Potash.	Lime.	Magnesia.	Iron.	Phosphorus.	Sulphur.
19·24	63·60	7·46	·07	4·90	3·29

No one can examine the above percentages without clearly understanding what mineral substances go to make his soil fertile, and therefore what he has to give back to it in order to keep it so.

(To be continued.)

STOCK FARMING.

Sale of Stock in the United States.

SALE OF HEREFORD BULL "PERFECTION."

An important sale of Aberdeen-Angus cattle was held at Chicago, U.S.A., in the beginning of February, when eighty-two head, the property of various breeders, realized an average of £135. Mr. M. A. Judy sold thirty-four head at an average of £236, his average for twenty-four imported cattle being £255. The bull Prince Ito, 12869, bred by Sir George Macpherson Grant, Bart., of Ballindalloch, made £1,820, a record price for a bull in America, the purchasers being Messrs. B. R. Pierre & Son; Blackcap Judy, bred by Mr. Judy, sold at £1,260 to Mr. C. H. Gardner; Pride D 3rd of Auchnachan sold at £212; Careston 2nd Pride, £252; Pride of Hope 3rd, £270; Cariston's Pride, £200; Dainty Pride of Haddo, £300; Pride of Easkmount, £200; Pride of Aberdeen 139th, £226; Black Enamel, £500; Blackberry of Advie, £200; Blackbird 23rd, £15; Eppy of Laggan, £200; Delia of Aldbar, £220; Primate of Polowich, £200. Mr. C. H. Gardner sold twenty-four head at an average of £57; Messrs. B. R. Pierre & Son, eight at an average of £81; Messrs. D. Bradforte & Son, nine at an average of £74. It is pointed out that the average broke the record; the average for imported cattle did the same, and so did the public sale price for Prince Ito. The highest public sale price of recent years for a cow was paid for Blackcap Judy. Previously the highest prices for Aberdeen-Angus were £610 for a bull and £560 for a cow. The sale was thus reported in the *Live Stock Journal*, and the subject of stock breeding from expensive sires is referred to in our Editorial Notes. The above illustration shews the sale of another famous bull which realised £1,500.

Supplement to the "Agricultural Journal," April 10, 1902.

NCE ITO.

Supplement to the "Agricultural Journal," April 10, 1902.

HEREFORD BULL "PERFECTION."

SOLD BY AUCTION AT CHICAGO FOR £1,500.

VETERINARY.

Report from Veterinary Surgeon Spreull on the Result of his Experiments with the Malarial Catarrhal Fever of Sheep.

As a very minute description of the symptoms and more especially of the post-mortem lesions of this disease has never been given I have been tempted to do so now. Since taking up this work five months ago I have had under close observation somewhere about one hundred cases of the disease, all produced by inoculation, and I am therefore able to fix the dates of appearance of the different lesions with certainty. The following description of the disease, which I believe differs somewhat from the type occurring naturally on the veld, refers only to the form produced by experimental inoculation.

Malarial Catarrhal Fever is a specific disease affecting sheep in the Cape Colony, characterized usually by high fever and very definite symptoms comprising chiefly lesions of the mouth and feet. It is non-contagious but highly inoculable. At first doses of 10 c.c. of virulent blood were used intravenously to produce the sickness, but soon it was found that a much smaller dose sufficed, also that subcutaneous inoculation was as certain and severe in its effects; in one case a single drop produced typical disease and death. Mr. Robertson, Government Veterinary Surgeon, has discovered that this disease is caused by a small intra-corpuscular parasite or *plasmodium* affecting the red blood corpuscles. It stains well by Plehn's method (eosin and methylene blue), when it is seen as a small more or less spherical body staining dark blue against the eosin red of the stained corpuscle. Even in very virulent blood the parasite is not so numerous as to be readily found in each microscopic field; larger forms, often flowerlike in shape, are frequent, and occasionally several small forms are seen in one corpuscle. In blood smears there are generally a few free bodies in the serum, but in the spleen pulp such forms are numerous, they then appear as small crenate, roundish bodies with a dark margin and clear centre, and vary very greatly in size.

Incubation.—The incubatory period, when the disease is produced under its usual conditions, is probably the same as when produced by inoculation. I have found it to be two, three, four or even five clear days, three days being the most common, but two and four days are frequent, whilst five days are more rare. The onset of the malady is marked by fever which is often severe, reaching as high as 107° F., but temperatures of 104° to 106° are the more usual, and sometimes fever is almost absent, yet the symptoms develop in the usual manner and at the proper time. The fever period generally extends from five to seven days, shorter and longer periods being frequent, and there is always a marked drop when the eruption takes place. Although the fever symptom appears so early it is not before the 7th to the 10th day that the distinctive symptoms in the mouth show themselves. A careful observer, however, would note that the sheep looked thin and did not feed as well as usual for one or perhaps two days preceding the eruption. Examination of the mouth may then detect a slight rosiness of its mucous membrane or occasionally an abnormal blueness, but very often such a change is unnoticeable. The first thing which generally attracts attention is a slight frothing at the mouth and swelling of the lips, particularly the upper, with a catarrhal discharge from the nostrils. On examination it will then be found that the mucous membrane of the mouth is somewhat blue in colour and the lips may be sore at the junction of the skin and mucous membrane, *i.e.*, just along their free margin. Next there is an œdematous infiltration into the mucous covering of the upper or dental pad and the mucosa immediately behind the incisors, this causes an abnormal whiteness of these parts. In mild cases this condition lasts two or three days, the loosened epidermis is rubbed away by feeding and recovery rapidly takes place. In a severe case, however, the surface of the pad becomes raw, sores appear inside the lips and cheeks and even on the bars of the hard palate, the tip of the tongue becomes sore by shedding of its epithelium and may be even gangrenous. In very severe cases the tongue becomes badly affected and may be almost wholly stripped of its epithelium and of a dark blue colour, in a few cases this organ becomes extremely œdematous, quite fills the mouth, making swallowing almost impossible, and there is a copious salivary discharge from the mouth. In such cases the tongue, especially on its lateral aspects, where the mucous membrane is thin, presents a glistening yellow or amber colour resembling a huge blister. In such severe cases the lips become immensely swollen by a serous infiltration into their subcutaneous and submucous tissues; the nasal discharge, growing profuse, dries on the diminished nasal apertures and causes difficulty in breathing manifested by a snoring sound. Sores often appear on the skin of the nostrils and muzzle at this stage, yet the pituitary membrane seems little affected and is of a good colour. There is occasionally an œdema of the lower parts of the face, and especially of the skin and tissues of the submaxillary space, extending now and then for a short way down the under surface of the neck. Despite the soreness of the mouth the sheep have usually an inclination to feed, yet loss of condition is rapid even when the mouth lesions do not for long interfere with feeding. Occasionally diarrhœa sets in, and this is always very fatal, blood being passed in the fæces in the later stages. As a rule the fæces are almost normal, except for a more or less abundant slimy mucous discharged along with them. The mouth lesions generally last from three to five days, but heal less rapidly than they form; a few days after the appetite returns the feet become tender and there is a bluish or red line around the coronets which is painful on pressure, especially at the bulbs or heels. It is rare that the skin of the pasterns is inflamed. Most commonly both fore feet are affected, sometimes all four, both hind, or a fore-foot and a hind one at the same time. The severity of the foot lesions is not always in the same degree as the soreness of the mouth, mild cases often become very foot-sore. This symptom generally appears from the 14th to the 17th day and passes off in a few days, but is aggravating whilst it lasts, as the sheep very often lie a great deal and refuse to feed, or if hungry, feed on their knees and consequently don't move about enough to fill themselves. It is rare that the feet become tender whilst the mouth is still sore, and in some cases the foot trouble is very mild or absent. During the febrile stage and the period when the mouth is sore there is great thirst; when the sheep begin to feed well again, vomiting often supervenes, more especially if they have had free access to water, the ingesta are voided by the nose, and in many cases are inhaled into the lungs, giving rise to a very fatal traumatic pneumonia, which is the only sequela I have met with in this disease. In young animals in poor condition, the disease runs through a very rapid and fatal course, often with diarrhœic complications, emaciation is severe, and the sheep lie persistently although the feet are not yet affected, the nose is brought around into the flank and sometimes the neck becomes twisted (wry neck), death ensuing within eight to ten days after inoculation. As a rule the disease has run its course and complete recovery taken place within twenty-one days after inoculation. I have never seen the eyes affected, nor shedding of the hoofs and casting of the fleece, symptoms which are recorded as occurring in veld infected cases.

Susceptibility.—The pure bred merino is most susceptible, especially when young; the disease becomes less severe as the adult stage is reached, but there is a great range in the susceptibility of individuals of the same breed. A few merinoes show a nearly complete natural immunity, others without showing fever develop all symptoms of the affection. Africander sheep seem to be rather insusceptible; Mr. Dixon had to abandon them in his experiments, and we are now using only one and two-year-old merinoes.

Post-mortem Appearances.—As a rule death arises from debility, and the mouth and other lesions are more or less healed by that time. In severe cases the tongue is more or less stripped of its epithelium, and may be gangrenous at the tip; the dental pad and inner surface of the lips are raw and excoriated and sores are found inside the cheeks in the molar region; these are often the last to disappear. The fauces and base of the tongue are healthy, and only in severe cases do we find the hard palate affected. The gullet is healthy, but the rumen often shows inflamed or congested patches, more especially affecting the pillars and the rumeno-reticular margin, which may be slightly ulcerated. In cases where vomition was frequent lesions of the rumen are sometimes absent on post-mortem. The reticulum is sometimes congested but the third stomach is always healthy. The abomasum may be severely inflamed or only mildly so, sometimes the fundus, sometimes the pyloric end is most affected, occasionally the mucous membrane is very œdematous in the latter region. There may be tumefaction and erosions of the rugæ with one or two larger ulcers at the pylorus, or again this stomach may be nearly healthy except for a multitudinous arrangement of punctiform petechiæ. The small bowel is often inflamed throughout, generally most so at the duodenum, very often the inflammation is only in patches or there may be only slight congestion. Where diarrhœa was severe before death, the small bowel is found badly inflamed, often with zebra markings, and Peyer's patches are inflamed and prominent; in such cases the large bowel is also inflamed even to the rectum, but generally this part of the alimentary canal is not much affected, much less so than the small bowel. The mesenteric glands are more or less inflamed and œdematous. The spleen is generally much enlarged, soft and pulpy; it is often firm, but seldom of a very dark colour. The liver is congested, but otherwise normal, the bile normal and the gall-bladder generally full. The kidneys are congested and may be marbled on their external surface from hæmorrhages into the cortex, sometimes they are œdematous, the capsule stripping off readily, the cortex may be of a brownish colour on section. In the chest we find occasionally a little yellow fluid, which is often present also in the pericardial sac, the heart is often congested and in severe cases shows ecchymoses under the endocardium and even deeply into its muscular structure, its cavities are generally full of a dark, fairly firm clot. The lungs are healthy except where much vomition has taken place, when the dependent parts are found of a dark red colour, hepatized or collapsed and œdematous, the trachea and bronchi being full of froth containing particles of the vomited ingesta, and their mucous membrane in a congested condition. The subcutaneous tissue of the jaw and under surface of the neck may contain a little colourless or pale yellow watery effusion.

Treatment.—Up till now all my endeavours have been made in the direction of a preventive inoculation, and knowing that the disease has a microbic origin one is not much inclined to turn to drugs as a palliative, but the action of such a drug as quinine might be investigated with benefit. For the mouth lesions I have employed solutions of chlorate of potash, tannic and boracic acids in glycerine and water, but such treatment is very empirical, and can do little towards the recovery of the parts. When the tongue and lips become very œdematous scarifying with a needle gives relief. The main idea of treatment must always be complete rest, cool and shady surroundings and succulent food. When the appetite returns water should be sparingly given as I think it favours vomition, a complication which is unusual before recovery has fairly set in. I find that the sick sheep readily lick salt.

Modes of Infection.

The *blood* of sheep suffering from Malarial Catarrhal Fever was found very infective for fresh sheep during the febrile and eruptive stages and for some considerable time after recovery. As already mentioned, subcutaneous injection proved as surely infective as the intravenous method, and the incubatory period was alike in both, the mortality being about the same. Individual susceptibility varied greatly; a few sheep showed no febrile reaction whatever, others contracted a mild fever only, whilst one or two became acutely fevered and yet showed no symptoms; blood tapped from these latter during the reaction proved virulent enough and produced typical disease with symptoms when injected into other sheep. Our experiments have been almost confined to yearling merinoes, and of these at least 75 per cent. have visibly contracted the disease on inoculation. As some of these animals were no doubt partially protected before undergoing the virulent test the true percentage of susceptible animals of this breed and at this age is doubtless somewhat higher. The blood drawn was generally citrated, but proved equally virulent when defibrinated; although almost always used fresh its strength was found unimpaired up to four days old. As already mentioned, very small doses, even down to a drop, proved capable of producing the affection, but in testing, doses of 2 c.c. to 5 c.c., injected subcutaneously, were considered best. In many cases it was noticeable that blood from a mild case produced mild sickness in a fresh sheep, whilst blood drawn from a severe case was very liable to reproduce a severe type of the disease.

Solutions of *spleen pulp* in sterilized water were made and these proved virulent on injection; in one case an enlarged spleen was used, in the other this organ was apparently normal, but both were taken from animals dead of malarial fever in the acute stage. No. 1 sheep, which had salted in this camp during April and did not react to a virulent blood test given on May 1st, was retested with a spleen pulp solution on June 6th and thereafter became severely fevered without showing any symptoms; blood drawn during this reaction proved virulent for fresh animals.

Infection by way of the serous membranes proved easy. Two sheep were infected by *intra-thoracic injection* of virulent blood; the former showed fever only, the latter became sick and recovered. In the same way *intra-abdominal injection* was found to produce the disease.

Two sheep were *drenched* with 8 to 10 oz. of fresh citrated virulent blood, no reaction ensued, and three to four weeks later they were tested intravenously. One became fevered but never sick, the other became mildly sick and recovered. From this experiment it would appear that infection does not take place through an unimpaired mucous membrane. In two cases where *scarification* was resorted to, one unfortunately proved refractory when tested, the other contracted pneumonia, pleurisy and empyema, and its blood when used upon other sheep proved non-virulent. In view of the very small amount of virus required to communicate the disease further attempts at infection of the mucous membranes should be made, as the means by which infection is spread on the veld remains unknown. In no case were we able to produce the disease by *contact*. Four sheep were placed in the most intimate and continuous contact with sick sheep for periods of eighteen to twenty-five days. They were kept in a small pen, fed at the same manger and drank at the same pail, the forage and water being often soiled by the nasal and salivary discharges of the sick animals. Two unfortunately proved refractory on test, but one gave a febrile reaction and another contracted the disease in a severe form. It will be interesting to discover whether this malady is spread by parasites, such as the mosquito or tick; possibly the latter plays the same role here as in heartwater. On one occasion I made smears of blood from an engorged female red tick plucked from a sick sheep, and under the microscope I found free bodies similar to those I have described as occurring in the spleen of sheep dead from malaria.

PRESERVED VIRULENT BLOOD.

Attempts were made to preserve virulent blood, and at first Mr. Dixon tried desiccation. Two sheep received a dose of citrated blood which had been dried at the ordinary temperature of the atmosphere and was twelve days old; one appeared to react mildly, but when tested both contracted malaria with all the usual symptoms. Next he added a preservative solution composed of equal quantities of glycerine and water and containing ½ per cent. of carbolic acid. This solution was added to citrated blood in equal parts, thus reducing the glycerine to 25 per cent. and the carbolic to ¼ per cent. of the whole. Citrated blood kept very well by this method, but gradually the blood corpuscles subsided so that the mixture became somewhat flocculent; it also assumed a very dark crimson colour. Defibrinaed blood preserved in this way remained of more equal. compositition. Virulent blood maintained its potency for a long time Seven sheep, each of which received an intravenous dose of this blood, preserved for periods ranging between eight and thirty-two days, contracted malarial fever in as severe a form as fresh virulent blood would have produced. Six other sheep received the same preserved bloods subcutaneously but at later periods and with similar results, one which received a blood sixty-five days preserved showed typical sickness. A sheep inoculated with a blood preserved for one hundred and five days became acutely fevered without symptoms, and, as already recorded, its blood produced typical disease when inoculated into a fresh animal.

SALTED BLOOD.

Very many injections were performed with the blood of "salted" or recovered animals, and very varied were the results produced. These inoculations showed that the blood of sheep recovering from malarial fever gradually becomes less virulent, but in some subjects this attenuation proceeds much more slowly than in others. In general the blood remained fairly virulent for about thirty days after the fever had abated. Blood obtained from a severe case fifty days after the fall of fever produced a typical sickness on intravenous injection, yet in a sheep inoculated subcutaneously there was no reaction, but this sheep appeared protected enough to develop only a mild sickness when tested. On the other hand, the result is somewhat different in the case of another which had rather a mild attack of the disease. Blood was tapped on the twenty-second day when the feet were yet recovering, and it produced mild fever in one case and no reaction in another. When tested the former showed fever only, and the latter developed symptoms and recovered. All shades of protection have been noted, but blood from sheep over fifty days salted appears to produce little effect. Results are much too irregular for any hard and fast line to be drawn, and I am of opinion that individual susceptibility has most to do with it; moreover, the result of the test inoculations seems largely to depend upon the sample of virulent blood used. In general, blood drawn from a severe case of sickness reproduced a severe type, whilst that of a mild one repeats its type.

Preserved Salted Blood.

Many of the salted bloods used in the above experiments were preserved in the manner already mentioned. Subcutaneous injections were performed into a number of sheep when the mixtures had been kept for periods ranging between fifteen and forty-two days, no distinct reaction ensued. Virulent blood tests performed from the sixteenth day onwards to the sixty-first generally caused sickness, and I am afraid protection could only have been slight. Curiously enough, the mortality in this series of experiments is less than that of the animals inoculated with the same series of salted bloods when fresh, and I can only put it down to better condition and a greater resistance in the individuals used. The degree of sickness produced after the test was much too severe to lead me to advocate this method as a protective.

Blood of Salted Sheep Retested.

Experiments made in this direction show that when virulent blood is injected into a salted sheep the plasmodium is not destroyed for some time at least. Two sheep (1 and 2) received a virulent injection when eighty-eight and sixty-three days recovered respectively. Blood tapped from No. 1 on the fifth day thereafter produced only a mild or doubtful reaction in two others (3 and 4). No. 3 was probably refractory as it resisted severe testing, but No. 4 became severely sick after a test performed thirty-nine days later. No. 2 was tapped eight days after injection and its blood then proved virulent for Nos. 5 and 6. Nos. 1 and 2 were again tapped on the twenty-first day (neither had shown any fever meanwhile), and their blood injected into Nos. 7 and 8 respectively. No. 7 had a slight febrile reaction which continued for some days after a test performed on the twenty-third day, no symptoms developing. No. 8 became sick about the sixteenth day and died-on the twentieth, showing slight malarial lesions—this is by far the longest incubatory period I have yet noticed in this disease. These results may be compared with those obtained in five other cases, when the blood of Nos. 1 and 2 was used at different periods after recovery (and previous to retest), and it will be seen that a retest frequently makes the blood of a salted animal again virulent for a time (we have had an exactly similar experience in redwater of the ox). Sheep No. 1 retested with spleen pulp solution gave like results which I have already referred to.

Bile.

Bile was collected from two severe cases of the disease and used subcutaneously, both fresh and glycerinated The fresh bile proved septic and set up grave sloughing at the site of inoculation; glycerinated bile, though safer, also caused a good deal of local trouble. No immunity appeared to be conferred and there is nothing to be said in its favour.

Blood of a Refractory Sheep.

A full-mouthed merino appeared on testing to be quite refactory. A second test was given, also without producing reaction, and blood drawn on the sixth and sixteenth days was injected into four sheep. Three out of these four sheep appeared to have a slight febrile reaction, two were tested on the twenty-first day,' one on the thirty-sixth and the last on the fifty-seventh, three developed the disease severely and died, the fourth recovered with difficulty but died soon afterwards from exposure.

Other Species Affected.

Up till now I have only been able to test several goats and a rabbit with the malarial blood of sheep. The *rabbit* received ·5 c.c. subcutaneously and reacted mildly during the seventeenth, eighteenth and nineteenth days, at which date I found the plasmodium in its blood. One *goat* was twice tested, but as she did not react I then concluded that this species was refractory. Later another goat was tested without reacting, but blood drawn from him on the twelfth day proved virulent for two sheep; the first turned moderately sick but the other showed all symptoms in a severe form and died on the tenth day. Goat No. 1, a two-tooth kapater, was tested in the same way, and its temperature chart, though erratic, never showed fever, but blood drawn on the ninth day proved virulent for a sheep, producing a mild attack of malaria. Further experiments are in progress, and I am testing the potency of the blood of goats at later periods with the object of determining whether an attenuated vaccine can be got from this species.

SERUM OF VIRULENT BLOOD.

A merino-africander cross received intravenously 10 c.c. serum of virulent blood and became fevered from the fourth to the fourteenth day, resisting a blood test later on. Two other sheep received a similar injection of serum from another case of malaria, both developed characteristic forms of the disease. In this case the serum, although carefully decanted and passed through a filter paper, was of a pale sherry colour, and no doubt the slight admixture of blood accounts for the infection of these subjects; it is probable that serum from a sick animal, if freed from corpuscles by thorough filtration, would not convey the disease when injected into fresh sheep.

FORTIFIED SERUM.

I have found it possible to fortify sheep as was done in the case of rinderpest and heartwater, and lately serum obtained from such animals has shown itself to be possessed of strong antitoxic properties. Sheep No. 114 received intravenously 10 c.c. carbolised serum from No. 4 without reaction, on the twelfth day later 2 c.c. virulent blood were given subcutaneously and on the twenty-first 10 c.c. intravenously, but with no apparent effect. No. 119 received intravenously 10 c.c. fresh serum from No. 6 without reacting, twenty days later 5 c.c. virulent blood were given subcutaneously, when a mild fever appeared lasting from the seventh to the ninth days. The serums mentioned were made from blood tapped on the thirteenth day after the last fortification in No. 4, on the nineteenth day in the case of No. 6. Nos. 124 and 125 each received 2 c.c. virulent blood subcutaneously and simultaneously 5 c.c. and 10 c.c. serum respectively under the skin of the opposite side; neither has in any way reacted during an interval of three weeks. Since then a few more inoculations have been made, the dose of serum being gradually reduced, and results are promising but not forward enough yet to be included in this report. I am hopeful that this serum will be found useful in checking mortality in infected flocks.

Note.—Animals experimented on were all numbered, and temperature charts accompanied them, but as the latter could not be included the numbers are not given except where necessary.

(*To be continued.*)

COUNTRY REPORTS.

Humansdorp.

E. T. Anderson, C.C. & R.M., 22nd March, 1902.—The past season has been a decidedly good one. The oatcrop has been a more than average one, both in quality and quantity, and a good crop of mealies is being harvested. The fruit crop has also been an abundant one, especially on farms adjoining the Gamtoos River. Special attention is being paid to orange culture in this locality. After a somewhat extended drought splendid rains have fallen throughout the District, and pasture for all kinds of stock is good and abundant. Cattle are in good condition. No locusts have been reported in these parts. Redwater has unfortunately broken out again in the vicinity of Storms River, Tzitzikama Forest. Cattle inoculated last year are reported to be immune.

Elliot.

J. P. Comming, R.M., 31st March, 1902.—Very little rain has fallen and ploughing is delayed. No further outbreaks of rinderpest or lung-sickness have been reported.

Artificial Manures.

The annexed list showing the agents from whom the various artificial manures may be obtained, and the current prices, is publiseed for the information and guidance of agriculturists.

Full particulars as to the composition of the respective fertilizers can be obtained on application to the agents; and attention is also invited to the analyses published in the *Agricultural Journal* of 9th January, 2nd April and 11th June, 1896; 30th Sept., 1897; 27th Oct., 1898; 13th Agril, 6th July, 1899 and 18th July, 1901.

List of Fertilizers.

Attwell & Co., Cape Town. (Agents for Alex. Cross & Sons, Ltd., Glasgow.)	Special Root Guano ..	£6	10	0	per ton of 2,000 lb,
	Potato and Grain Guano ..	8	5	0	,, ,,
	Nitrate of Soda	12	0	0	,, ,,
	Superphosphates 39/40 per cent ..	6	0	0	,, ,,
	Scotia Basic Slag (cont. 30 per cent. Tribasic Phosphate of Lime)	4	15	0	,, ,,
	Sulphate of Ammonia ..	0	19	6	per 100 lb.
	(Prices free on trucks, Cape Town)				
Jas. Searight & Co., Cape Town.	No. 1 Superphosphates .. (containing 12·14 per cent. Phosphoric Acid soluble in water, being equal to 26·30 per cent. Tribasic Phosphate of Lime). ..	£5	0	0	per ton of 2,000 lb.
	No. 2 Superphosphates ..	5	10	0	

Jas. Searight & Co., Cape Town.	(containing 14·16 per cent. Phosphoric Acid soluble in water, being equal to 30·35 per cent. Tribasic Phosphate of Lime). ..	
	No. 3 Superphosphates ..	£6 0 0 per ton of 2,000 lb.
	(containing 17·18 per cent. Phosphoric Acid soluble in water, being equal to 37·39 per cent. Tribasic Phosphate of Lime). ..	
	Vine Fertilizers	9 0 0 ,, ,,

A reduction of 5s. per 2,000 lbs. is allowed on orders of 100 bags or more. Special rates can be arranged if delivery is taken ex importing steamer, the goods being trucked at Docks.

Woodhead, Plant & Co. Cape Town.	Thomas' Phosphate Powder ..	£4 15 0 per ton of 2,000 lb.
	Superphosphates ..	5 15 0 ,, ,,
	Nitrate of Soda ..	14 0 0 ,, ,,
	Muriate of Potash ..	16 0 0 ,, ,,
	Sulphate of Potash ..	16 0 0 ,, ,,
	Wheat Fertilizer ..	8 10 0 ,, ,,
	Kainit	4 15 0 ,, ,,
	Potato	1 15 0 per 200 lb.
	Vineyard Manure ..	1 15 0 ,,
	Tobacco Manure ..	1 15 0 ,,
	Sulphate of Ammonia ..	1 2 6 per 100 lb.

Subject to a discount for cash.

De Waal & Co., Cape Town.	Jadoo Fibre	10s. 6d. per bale of 100 lb.
White, Ryan & Co., Cape Town.	Potato, Vegetable and General garden	£8 10s. per ton of 2,000 lb. If less than ½ ton 18s. 6d. per bag of 200 lb.
	Pure Ground Bone	£6 10s. per ton of 2,000 lb. If less than ½ ton 13s 6d. per bag of 200 lb.
White, Ryan & Co., Cape Town.	Quick-acting Bone and Potash Mixture	£7 per ton of 2,000 lb. If less than ½ ton 16s. per bag of 200 lb.
	Selected Bone Meal for Cattle, Horses, Pigs and Poultry ..	15s. 6d. per 100 lb.; special price per ton.
	Bone Grit for Fowls ..	12s. 6d. per 100 lb.
	Superphosphates ..	Wholesale only.
Malcomess & Co., E. London.	"Malcomess" A. Fertilizer, for Potatoes, Mealies, Vegetables, Orange and other trees ..	£9 per ton of 2,000 lb.
	"Malcomess" B. Fertilizer, for cereals, especially wheat ..	£9 per ton of 2,000 lb.
	Accompanied by guaranteed analysis by Prof. Hahn ..	(less 5 per cent for cash).
James Flower & Sons, Cape Town.	"H.B.T." Gypsum	£3 10s. per ton of 2,000 lb.
	Pure Ground Bone Meal ..	£8 10s. ,, ,, (in bags f.o. trucks—Cape Town).
Government Guano :—	Ordinary Guano	£6 10s. per ton of 2,000 lb. or 13s. per bag of 200 lb.
	Rock Guano	£6 17s. per ton of 2,000 lb. or 13s. 9d. per bag of 200 lb.

For use within limits of Colony.
Price includes delivery at Cape Town Railway Station.

D. E. Hockly & Co., East London.	"Hockly's Special Fertiliser." A complete manure for all crops	£9 per ton of 2,000 lbs. less 5 per cent for cash.
	Pure Bone Meal	Special Price.

The Feather Market.

CAPE TOWN PRICES.

Messrs. Wm. Spilhaus and Co. report, under Saturday's date, March 29, as follows:—

Ostrich Feathers.—Owing to the holidays, we have no market to report upon this week. There is a fair amount waiting disposal.

	£	s.	d.	£	s	d.
Whites (primes)	13	0	0	16	0	0
Firsts (superior)	10	0	0	12	0	0
Firsts (ordinary)	8	10	0	9	10	0
Seconds	7	0	0	8	0	0
Thirds	4	0	0	5	0	0
Inferior and stalky	2	0	0	2	10	0
Byocks	5	0	0	7	0	0
Feminas: Firsts (superior)	8	0	0	9	10	0
Firsts (ordinary)	5	10	0	7	0	0
Seconds	4	0	0	4	10	0
Thirds	2	10	0	3	0	0
Inferior and stalky	1	0	0	1	10	0
Dark	4	0	0	6	0	0
Spadonas: White	2	0	0	2	10	0
Light and dark	0	15	0	1	0	0
Boos: White	1	12	6	2	0	0
Light	1	0	0	1	7	6
Black butts	0	10	0	0	15	0
Dark	0	10	0	0	12	6
Inferior	0	5	0	0	7	6
Blacks: Long	4	10	0	6	0	0
Long medium	2	10	0	3	10	0
Medium	1	10	0	2	0	0
Superior short	0	12	6	0	15	0
Ordinary short	0	7	6	0	10	0
Long floss	1	5	0	1	15	0
Medium floss	0	7	6	0	12	0
Short floss	0	4	0	0	5	0
Drabs: Long	3	0	0	4	0	0
Long medium	1	10	0	2	10	0
Medium	0	15	0	1	0	0
Superior short	0	7	6	0	10	0
Ordinary short	0	2	6	0	5	0
Long floss	1	5	0	1	15	0
Medium floss	0	7	6	0	12	6
Short floss	0	2	6	0	5	0
Inferior Long Blacks and Drabs	1	5	0	1	10	0
Floss, Blacks and Drabs	0	5	0	0	7	6
Wiry Blacks and Drabs	0	0	6	0	1	0
Chicks	0	1	0	0	2	0

Feeding Stuffs.

ENGLISH PRICES per ton of 2,240 lb.		£	s.	d.			s.	d.
Bran, London Broad		5	10	0	to	5	12	0
Linseed Cake, London made	ex mill	8	7	6	,,	8	10	0
American	ex dock	7	5	0	,,	7	7	6
Russian (in bags)	,,	7	15	0	,,	7	17	6
Calcutta		7	12	6	,,	7	15	0
Cottonseed Cake, London made	ex mill	4	7	6	,,	4	10	0
Decorticated	ex dock	6	10	0	,,	6	15	0
Meal	,,	6	7	6			—	
Rape Cake, East Indian		4	5	0			—	
Maize, English Germ Meal	ex mill	5	17	6	,,	6	0	0
American	c.i.f.	5	7	6	,,	5	10	0
Rice Meal, Rangoon	in warehouse		—		,,	5	5	0
Locust Beans, Cyprian		5	6	0	,,	5	12	0

Mark Lane Express, *March 3rd, 1902.*

GOVERNMENT NOTICES.

Cape Government Railways.

ADMISSION OF APPRENTICES INTO THE LOCOMOTIVE DEPARTMENT.

There are vacancies for Apprentices in the following Branches of the Locomotive Workshops at Salt River, viz. :—

Boiler Shop	Three boys for heating rivets and cleaning Boilers, to learn the trade of a Boilermaker.
Carriage Shop	Two boys, to learn the trade of a Sawyer.
Carriage Shop	One boy, to learn the trade of a Carriage Fitter.
Carriage Shop	Two boys, to learn the trade of a Coach Builder.
Carriage Shop	Two boys, to learn the trade of a Coach Painter.
Blacksmith Shop	One boy, to work steam hammer ;

and applications from youths between the ages of 14 and 16 are invited for filling the vacancies.

Applicants must have passed the 5th Standard, and will be required to produce a certificate to that effect, and also certificates as to character.

Applicants who are able to produce proofs of having satisfactorily passed a higher standard of education will receive the preference in filling the vacancies, other things being equal.

The rate of pay to commence with will be 2d. per hour.

Applications should be sent to the Chief Locomotive Superintendent or Locomotive Superintendent, Salt River, from whom any further particulars can be obtained.

Office of the General Manager of Railways, Cape Town,
8th March, 1902.

T. R. PRICE,
General Manager.

Farmers' Apprentices. Dairy Assistants, &c.

As inquiries are from time to time received from young men from abroad as to where they may serve apprenticeship or gain practical experience of farming in this Colony, before starting on their own account, the Secretary for Agriculture invites Farmers who are willing to receive young men of good character, for this purpose, to register their names with the Under Secretary for Agriculture, stating the class of farming they do, how many young men they are prepared to take, and for what period they would enter into an agreement.

It is not probable that these young men will be in a position to give more than their free services in return for the experience they will gain ; that is, they will not be able to pay any fee ; and they will look to receiving free board and lodging in return for their services.

It is to Farmers, therefore, who are willing to grant such young men free board and lodging in return for services rendered, that this application is especially addressed.

With reference to the above notice to Farmers, the Secretary for Agriculture now invites young men who are willing to engage themselves as Farmers' Apprentices in Cape Colony to register their names with the Under Secretary for Agriculture, Cape Town. The apprentice will gain experience in farming in South Africa, and have an opportunity for spying out the land before starting on his own farm. To the new comer from another country this is essential, for he has much to learn and unlearn.

Many applications for such Apprentices have been received from Farmers in the Colony. It will be noted that the Apprentice will neither receive wages, nor pay a fee. He will get free board and lodging in return for his services, and at the same time acquire the experience he is in need of.

Applications for employment have also been received from several Lady Dairy Experts and Dairy Assistants; and Dairy Farmers and others desiring to avail themselves of the services of such are invited to register their names with this Department, giving particulars as to situation and extent of operations, etc., and salary and other emoluments they are prepared to offer.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM BASUTOLAND.

By command of His Excellency the Governor, the following Proclamation No. 164, 1901, was published in the Government Gazette of October 29th, 1901:—

Whereas by Proclamation No. 100, bearing date the 4th day of June, 1901, I did, by reason of the existence of the disease amongst cattle known as Rinderpest in the Territory of Basutoland, prohibit the introduction of horned cattle from the said Territory into this Colony:

And whereas the said disease has spread to the portions of this Colony which adjoin the said Territory, thus rendering it unnecessary to longer maintain the prohibition imposed by the said Proclamation:

Now, therefore, under and by virtue of the powers and authorities in me vested, I do hereby proclaim, declare and make known that from and after the date hereof the prohibition upon the introduction of horned cattle from Basutoland into this Colony shall be removed: the said Proclamation No. 100 of 1901 being hereby repealed accordingly.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM ORANGE RIVER COLONY AND THE TRANSVAAL.

By command of His Excellency the Governor, the following Proclamation No. 189 1901, was published in the Government Gazette of August 16th, 1901:—

Under and by virtue of the powers vested in me by the "Animal Diseases Act," No. 27 of 1893, and by the "Animals Diseases Rinderpest Amendment Act," No. 2 of 1897, I do hereby proclaim, declare and make known that it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced into any part of this Colony from the Orange River Colony and the Transvaal, save and except such cattle as may be required to be introduced by the Government for the purpose of supplying Bile or Serum for inoculation against Rinderpest:

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed

And I do hereby further declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

Proclamation No. 217, bearing date the 29th day of October, 1900, together with the regulations issued thereunder, is thereby repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined Regulation for checking the spread of the infection is republished.

REGULATION ISSUED UNDER PROCLAMATION No. 30, DATED 20TH JANUARY, 1899.

Whenever under the provisions of Sections 11 and 12 of Act No. 27 of 1893, any area is declared or proclaimed to be an area infected with Rinderpest, it shall not be lawful for any person, animal, animal produce, article or thing, who or which may, in the opinion of the Magistrate of the District in which such area is situated, be liable to convey infection of Rinderpest, to leave or to be removed therefrom.

Inoculation Against Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of the Colony, it is desirable to inform stock-owners of the intentions of the Government as to dealing with the outbreak should it unfortunately become general in the Colony, and to advise stock-owners as to the best course to follow.

The Government propose that, as a general rule, cattle-owners themselves should perform the inoculation. Glycerinated Bile will be used, though circumstances may arise where it will be preferable to use Serum.

Bile Stations will be established in suitable places as necessity arises in localities where farmers have agreed to contribute the required proportion, say 5 per cent., of their cattle for production of the bile. It must be clearly understood that unless farmers are prepared to thus contribute the necessary cattle, it will be impossible for them to have the benefit of a Bile Station.

Glycerinated Bile will be issued free to contributors in proportion to the number of cattle contributed to a Bile Station. To non-contributors a fair charge will be made for bile if any be available for issue.

Serum will be charged for at the rate of £1 per bottle of ten doses.

A limited supply of Glycerinated Bile to meet emergencies will, for a time, be available, free of charge, from the Bile Station which has been established under arrangements with the Imperial Military authorities near Aliwal North.

As occasion requires, Demonstrators will be sent to instruct farmers in the method of inoculation, free of charge. They will, as a rule, inoculate only enough cattle to show how it is to be done, leaving the owner to continue the work. The Government will supply syringes on application to the Resident Magistrate, or to the Demonstrators at the following charges: 20 cc. capacity, 20s; 10 cc. capacity, 15s. This payment may be recovered on return of the syringe to the Magistrate, in good order.

After the experience gained during the outbreak of 1896-1898, the Colonial Veterinary Surgeon wrote* as follows:—

"The method of inoculation which I would recommend in future sporadic outbreaks of the disease is briefly as follows: –

" *Infected Herds.*—These should be inoculated at once with either serum or glyceri-
" nated bile; every animal which indicates infection by a rise of temperature should
' receive a large dose of not less than 100 cc. of serum, or 30 cc. of glycerinated bile;
" the latter should, by preference, be injected into the jugular vein, so as to secure its
" immediate action. Then from eight to twelve days after, all the animals in the herd
" which give no indication of being infected with the disease, or fever temperature,
" should receive an injection of pure bile; not less than 10 cc., and for large animals
" 20 cc. This will confer a lasting immunity sufficient for all practical purposes.

" *Clean Herds.*—When it is decided to inoculate a clean herd, which is in danger of
" becoming infected through its proximity to diseased cattle I would recommend that
" the animals composing the herd should be inoculated first with 20 cc. of glycerinated
" bile, and to follow this inoculation in from eight to twelve days with an injection of

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* See *Agricultural Journal*, June 8, 1899, in which will be found a full consideration of the different methods of inoculation.

"from 10 to 20 cc. of pure bile. This will confer a strong and lasting immunity on the "animals in the herd, and will be free from risk arising from the inoculation or of "introducing the disease.

"*Use of Pure Bile.*—Pure fresh bile should not be used in an infected herd, if any "of the other inoculating materials can be obtained, as it tends to intensify the "character of the disease in those already infected, and its immunising effect is too "slowly developed to protect the healthy cattle against infection, if they are left in "contact with those already sick. If no other means are available, however, the "temperatures of the whole of the cattle in the infected herd should be carefully taken "by the clinical thermometer, and only those which register a normal temperature "should be inoculated with pure bile, the others should be separated from the inoculated "lot at once, and carefully tended. If glycerine can be obtained, the spare bile should "be mixed with it in the proper proportions—one part of glycerine to two parts of "bile. This mixture, after standing forty-eight hours, may be injected into the affected "animals in large doses, not only with safety, but with marked benefit.

"*Preparing the Bile.*—The bile should be taken from an affected animal immedi-"ately after death, or from one which is killed in the last stage of collapse.

"Biles of all shades of colour—except those which are red from the presence of "blood—may be used, so long as they are clear and free from a putrid smell. Thin "light yellow biles should also be rejected.

"All the galls extracted at one time should be mixed together, after standing sepa-"rately for twelve to eighteen hours, so as to render them uniform in strength and "immunising properties. Pure bile should be used on the second day after being "drawn, unless it is kept in an ice chest, when it may be kept sweet much longer. But "if pure bile is used as a second inoculation only, as above directed, it is not desirable "to keep it longer than twenty-four hours.

"Glycerinated bile is made by adding one part of glycerine to two parts of bile, stir "the mixture well, then mix all the biles taken at one time, and allow them to stand "for eight days. But if there is urgency, the glycerinated bile may be used forty-eight "hours after it is mixed.

"I would strongly recommend that in every outbreak of the disease that occurs, "every drop of suitable bile, obtained from the animals which die, should be mixed "with glycerine in proper proportions, two parts of the bile to one of glycerine, so that "it may be preserved and made available for the inoculation of infected herds, and also "for the first inoculation of clean herds which may be considered in danger. Pure "bile for the second inoculation of clean herds can always be obtained when the "disease appears in any locality, which would be the only reason for inoculating clean "herds in the immediate vicinity."

Taking the Bile.—To remove the bile the animal must be laid on its left side, the skin and flesh on the right side immediately behind the last rib being cut through; the ribs being raised, the gall bladder will become visible. The gall bladder should be then punctured with a small knife and the gall allowed to escape into a wide-mouthed bottle. If wide-mouthed bottles are not available then ordinary whisky bottles may be used with an *enamelled* funnel, which can be procured at any country store. Every precaution must be taken that the operation is performed in a thoroughly clean manner, the hands of the operator and all knives, &c., being thoroughly cleansed before use.

Inoculating.—After having secured the animal to be operated upon, the necessary dose of bile is injected under the skin of the dewlap by means of a Hypodermic Syringe, care being taken that the point of the needle is not inserted into the flesh, but between the skin and flesh.

Symptoms of Rinderpest.

The Outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined description of the symptoms of Rinderpest is hereby published:—

The early symptoms of Rinderpest are a rise of internal temperature to 106 or 107° Fahr.; the animal stands with its head hanging down, ears drawn back and coat staring; it refuses all food and occasionally shivers. A mucous discharge flows from the eyes and nostrils; the extremities are cold, and the breathing is laboured and frequently accompanied with moaning. The inner part of the upper lip and roof of the mouth and all visible mucous membranes are reddened, and covered with an eruption of minute pimples, and later with a branlike exudation. The bowels are

occasionally constipated, but in most cases diarrhœa sets in, the evacuations being slimy and very frequently of a dirty yellow colour. The prostration of strength is great, the animal staggering when made to move. In milch cows the secretion of milk is rapidly diminished, and soon ceases altogether. The disease usually ends fatally in from six to ten days.

It is generally believed that the infection is produced through the respiratory organs; from there the contagion becomes generalised. The contagion exists in the secretions and excretions, urine, saliva, mucous secretions of the nose, mouth and eyes, in the sweat, expired air, blood, and in all the tissues. It may be conveyed directly by the diseased animals, or indirectly by the dung, the bedding, the earth, hides, wool, meat, clothing, wagons or vessels, by people, dogs, sheep and chickens, &c. Contagion takes place only through short distances. When the weather is dry this is reduced to its minimum (about 27 yards), and the progress of the disease may be stopped by a ditch separating the diseased from the healthy animals.

In order to detect the earliest symptoms of Rinderpest, owners of horned cattle are warned of the urgent necessity for keeping a constant and close watch upon their stock. Any suspicious cases should be immediately reported to the nearest Resident Magistrate, Field-cornet or Police Officer, and the sick animal kept separate till an inspection is made. Stock should be carefully examined daily by a responsible person, more particularly for any symptoms resembling those above described.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October, 1900:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(a) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(b) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B' hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung sickness and are free from disease; or have been effectively inoculated against Lung-sickness and are free from disease, viz.:—

Number and general description of Cattle ....
....
....
Owner's name and address ....
....
In charge of..
Place to which Cattle are being sent..............................
(Signature)..
(Address)..
Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature..
(Address)..
Date....................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a

period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle

Owner's name and address

In charge of........

Place to which Cattle are being sent..........

(Inspector's signature).

(Address).............

Date....................

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be a follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Seed Oats.

In connection with the Notice appearing in the *Agricultural Journal* of the 14th March, 1901, and subsequent issues, it is notified for the information of farmers and others interested, that a small quantity of "*Texas Rust-resistant*" and "*Algerian*" Oats raised from seed imported by the Government, is now available for distribution for experimental sowing, at 19s. per bag of 150 lbs.

Applicants must pay carriage from Cape Town Station.

As the quantity of seed at disposal is very limited, not more than 2 bags can be allowed to any one person.

Applications, accompanied by a remittance to cover cost of the seed, should be sent in, at once, addressed to the Under Secretary for Agriculture, Cape Town; and will be dealt with in the order in which they are received.

RAINFALL, FEBRUARY, 1902.

I. CAPE PENINSULA:

	INCHES.
Royal Observatory (a) 12 inch gauge	0·52
Cape Town, Fire Station	0·46
Do. South African College	0·56
Do. Sea Point (Hall)	0·39
Do. Molteno Reservoir	0·60
Do. Platteklip	0·86
Do. Signal Hill	0·22
Table Mountain, Disa Head	0·88
Do. Kasteel's Poort	2·65
Do. Waai Kopje	3·11
Do. St. Michael's	3·40
Devil's Peak, Block House	1·09
Do. Nursery Gauge	0·83
Do. Lower Gauge	0·56
Rondebosch	1·04
Kenilworth	0·95
Wynberg (St. Mary's)	0·72
Groot Constantia	0·92
Tokai	0·89
Simon's Town (Wood)	1·09
Do. (Gaol)	1·19
Strandfontein	0·30
Camp's Bay	0·34
Fish Hoek	0·66
Cape Point	0·27
Smith's Farm	0·82
Durbanville	0·66

II. SOUTH WEST:

	INCHES.
Klapmuts	1·27
Stellenbosch (Gaol)	1·08
Somerset West	0·77
Paarl	1·65
Wellington (Gaol)	1·56
Weltevreden	2·12
Tulbagh	0·33
Kluitjes Kraal	1·79
Ceres	1·30
Rocklands	0·45
Caledon	3·10
Worcester (Gaol)	1·88
Do. (Meiring)	2·04
Do. (Station)	2·04
Hex River	2·05
Lady Grey (Div. Robertson)	2·54
Robertson	5·83
Do. (Govt. Plantation)	4·24
Montagu	3·90
De Hoop (Div. Robertson)	9·82
Piquetberg Road	0·85
Ceres Road	1·25
De Doorns	2·44
Danger Point	0·75

III. WEST COAST:

	INCHES.
Port Nolloth	0·00
Klipfontein	0·00
Kraaifontein	0·00
O'okiep	0·00
Springbokfontein (Gaol)	0·00
Concordia	0·00
Kersefontein	0·36
The Towers	0·48
Dassen Island	0·24
Malmesbury	0·68
Piquetberg	1·21
Clanwilliam (Gaol)	0·55
Do. (Seydell)	0·61
Hopefield	0·21
Zoutpan	0·32
Wupperthal	0·80

IV. SOUTH COAST:

	INCHES.
Cape L'Agulhas	0·84
Bredasdorp	3·67
Swellendam	14·78
Heidelberg	11·79
Riversdale	6·83
Dumbie Dykes	4·66
Mossel Bay	4·65
George	6·37
Millwood	6·89
Sour Flats	5·99
Concordia	4·56
Knysna	3·52
Buffels Nek	7·70
Harkerville	2·99
Plettenberg Bay	4·30
Forest Hall	5·38
Blaauwkrantz	7·21
Storm's River	4·70
Witte Els Bosch	3·34
Humansdorp	3·17
Cape St. Francis	2·03
Witteklip	1·90
Van Staaden's (upper)	1·51
Do. (lower)	1·17
Uitenhage	1·54
Port Elizabeth (Harbour)	1·38
Do. (Victoria Park)	1·86
Walmer Heights (near Port Elizabeth)	1·75
Tankatara	1·21

IV. SOUTH COAST—*continued.*

	INCHES.
Lottering	5·20
Shark's River (Nursery)	2·00
Do (Convict Station)	1·28
Grootvader's Bosch	20·14
Karnmelks River	3·20
Armadale	4·18
Vogel Vlei	4·30
Great Brak River	4·33
Melkhoutfontein	5·68
Uitenhage (Park)	1·68
Centlivres	0·94

V. SOUTHERN KARROO:

	INCHES.
Touws River (D.E.'s Office)	2·59
Do (Station)	2·13
Ladismith	4·92
Amalienstein	3·17
Calitzdorp	3·25
Oudtshoorn	2·65
Vlakte Plaats	2·15
Uniondale	1·66
Glenconnor	1·25
Triangle	4·72
Grootfontein	0·93
Pietermeintjes	2·59
Bok River	1·89
Verkeerde Vlei	1·37
Seven Weeks Poort	4·14

VI. WEST CENTRAL KARROO:

	INCHES.
Matjesfontein	1·21
Prince Albert Road	2·24
Fraserburg Road	0·75
Prince Albert	0·49
Zwartberg Pass	4·65
Beaufort West	0·91
Camfer's Kraal	0·40
Lower Nel's Poort	0·62
Baaken's Rug	0·71
Willowmore	0·50
Steytlerville	1·36
Laingsberg	1·07

VII. EAST CENTRAL KARROO:

	INCHES.
Aberdeen (Gaol)	0·83
Do. (Bedford)	0·96
Aberdeen Road	1·08
Rietfontein	1·77
Kendrew (Holmes)	1·38
Do (Edwards)	1·70
Graaff-Reinet	1·63
Do. (College)	1·51
Do. (Engineer's Yard)	1·40
New Bethesda	1·18
Roode Bloem	2·19
Jansenville	1·25
Toegedacht	1·88
Klipfontein	2·43
Pearston	1·89
Walsingham	1·52
Somerset East	3·84
Do. (College)	3·95

VII. E. C. KARROO—*continued.*

	INCHES.
Longhope	3·50
Bloemhof	1·71
Klipplaat	1·91

VIII. NORTHERN KARROO:

	INCHES.
Sutherland	0·89
Fraserburg	0·10
Carnarvon	0·85
Wagenaar's Kraal	0·65
Victoria West	1·57
Britstown	1·75
De Kruis	1·73
De Aar	0·92
Hanover	1·83
Philip's Town	2·47
Boschfontein	2·54
Petrusville	1·46
Naauwpoort	2·82
Colesberg	2·80
Rietbult (Colesberg Bridge)	1·40
Stonehills	3·20
Cradock	4·11
Do. (Rose)	3·68
Witmoss	1·97
Steynsburg	1·58
Do. (Nesemann)	1·55
Tarkastad	2·66
Drummond Park	2·64
Riet Vlei	2·52
Zwagersfontein	1·40
Culmstock	0·84
Hillmoor	1·98
Glen Roy	3·36
Spitzkop	3·23
Kleinhaasfontein	2·49
Beyersfontein	0·42
Haasfontein	1·28
Zeekoegat	1·70

IX. NORTHERN BORDER:

	INCHES.
Pella	0·00
Campbell	27
Douglas	1·80
Avoca (Herbert)	1·83
Eskdale	1·88
Orange River	2·72
Newlands (Div. Barkly West)	3·96
Kimberley (Gaol)	1·58
Do. (Stephens)	1·87
Barkly West	3·35
Karree Kloof	0·00
Rutland	4·48

X. SOUTH-EAST:

	INCHES.
Daggaboer's Nek	2·39
Fairholt	2·17
Bedford (Gaol)	2·16
Cullendale	2·13
Adelaide	2·89
Atherstone	2·82
Alexandria	0·88

X. SOUTH-EAST—*continued.*	INCHES.
Salem	2·40
Graham's Town (Gaol)	3·27
Do. (Bact.Inst.)	2·93
Heatherton Towers (near Graham's Town)	2·36
Fort Beaufort	0·95
Balfour	2 88
Seymour	2·12
Glencairn	3·22
Alice	2·20
Peddie	2·96
Cathcart	2·70
Keiskama Hoek	2·82
Crawley	1·60
Thomas River	2 89
King William's Town	1·62
Do. Hospital	1·60
Stutterheim (Wylde)	3·62
Do. (Besté)	3 42
Dohne	1·67
Lynedoch	2·05
Kubusie	2·50
Kei Road	1·79
Berlin	1·10
Fort Jackson	1·42
Komgha	3·66
East London, West	1·50
Do. East	1·55
Katberg Sanatorium	3·45
Bolo	3·31
Melrose	1·41
Sunnyside	2·57
Chiselhurst	1·43
Scott's Bottom	1·48
Dontsah	3·18

XI. NORTH-EAST:	
Venterstad	2 49
Ellesmere	4·85
Burghersdorp	3·29
Cyphergat	2 40
Thibet Park	2·01
Sterkstroom	4·32
Do. (Station)	4·19
Rocklands	4·50
Aliwal North (Gaol)	3·48
Do. (Brown)	4·65
Carnarvon Farm	3·49
Jamestown	3·10
Queenstown (Gaol)	2·38
Tylden	3·17
Herschel	6·00
Bolotwa (Contest)	2·41
Lady Frere	3·68
Keilands	2·04
Barkly East	4·09

XI. NORTH-EAST—*continued.*	INCHES.
Glenlyon	7·59
Lyndene	2·86
Mooifontein	1·42
Poplar Grove	3·33
Whittlesea	3·38
Halseton	3·61
Blikana	4·65
Middlecourt	3·51

XII. KAFFRARIA:	
Nqamakwe	4·59
Main	1·57
Butterworth	3·13
Kentani	2 22
Idutywa	2·75
Willowvale	1·59
Mount Fletcher	5·68
Umtata	2 15
Qumbu	3·56
Kokstad	5·65
Umzimkulu	3·10
Woodcliff	7·48
Tabankulu	7·76
Kilrush	6 65
Somerville (Div. Tsolo)	2·81
Tsomo	1·64
Seteba	4·10
Flagstaff	5·48
Quebe	4·38
Insikeni	5·16
Bazeya	4·85

XIII. BASUTOLAND:	
Mohalie's Hoek	5·06
Qacha's Nek	4·56
Moyeni Quthing	5·78
Teyateyaneng	2·59
Maseru	3·73

XIV. ORANGE RIVER COLONY:	
Bethulie	3·76
Kroonstad	5·26

XV. NATAL:	
Durban, Observatory	2·09

XVI. BECHUANALAND:	
Vryburg	2·11

XVII. RHODESIA:	
Hope Fountain	1·11
Geelong	0·44
Chishawasha	3·28

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, 15th April, 1902, as telegraphed by the Civil Commissioners of the places respectively named, is published hereunder.

CENTRE.	A. Wheat per 100 lb.	B. Wheat Flour per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal per 100 lb.	F. Barley per 100 lb.	G. Oats per 100 lb.	H. Oat-hay per 100 lb.	J. Potatoes per bag	K. Tobacco (Boer Roll.) per lb.	L. Beef per lb.	M. Mutton per lb.	N. Fresh Butte per lb.	O. Eggs per doz.	P. Cattle (Slaughter)	Q. Sheep Slaughter
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Aliwal North ..	0 8 0	0 17 0	0 11 0	0 9 0	0 10 6	0 12 0	0 15 0	0 12 6	0 17 0	0 1 0	0 0 10	0 0 10	0 1 3	0 2 3	£15 to £17	18/- to 20/-
Beaufort West .	0 12 6	0 16 0	0 13 0	0 12 6	0 12 6	0 13 6	0 15 0	0 5 6	0 10 0	0 1 0	0 0 8	0 0 7	0 2	0 2 6	£15 to £18	20/ to 22,6
Burghersdorp ..	0 8 0	...	..	...	...	0 7 6	...	...	0 8 0	...	0 0 6	0 0 7½	0 1	0 2 6	...	...
Cape Town ..	0 10 0	0 12 6	0 11 0	0 9 0	0 11 0	0 9 0	0 11 0	0 9 0	0 18 0	0 0 6	0 0 7½	0 0 8½	0 1 9	0 3 0	17 0 0	1 4 0
Clanwilliam .	...	...	...	...	...	...	...	...		...	...	...		...	...	...
Colesberg ..	0 9 11	...	...	...	...	0 7 6	...	...	...	...	...	...	0 1 6	0 2 6	...	...
Cradock .	...	..	...	...	..	...	...	...	...	...	...	...	..	...	...	...
Dordrecht ..	0 9 0	0 17 0	0 14 0	0 10 0	0 12 0	0 9 0	0 14 0	0 6 6	0 12 0	0 1 6	...	...	0 1 6	0 6	...	...
East London ..	0 11 6	0 17 3	0 11 6	0 10 9	0 9 9	0 15 9	0 18 3	0 12 6	0 18 6	0 1 6	0 1 0	0 1 0	0 2 9	0 4 0	..	...
Graaff-Reinet ..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Graham's Town ..	...	...	..	0 12 6	...	0 9 0	—	0 7 0	0 10 6	0 1 2½	0 0 8	0 0 10½	0 2 2	0 3	...	...
Kimberley ..	0 13 6	0 17 0	0 14 0	0 13 0	0 12 0	0 12 6	0 15 0	0 14 0	1 4 0	0 1 0	0 1 0	0 0 11	0 2 0	0 3 6	£12 to £18	20/- to 24/-
King Wm's Town	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...
Malmesbury ..	0 10 0	0 15 0	0 12 0	0 10 0	...	0 7 6	0 9 6	0 8 0	0 13 6	0 2 0	0 0 8	0 0 7	0 1 9	0 2 0	14 0 0	1 4 6

CURRENT RATES OF AGRICULTURAL PRODUCE—(*continued*).

CENTRE.	A. Wheat per 100 lb.	B. Wheat Flour per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal. per 100 lb.	F. Barley per 100 lb.	G. Oats per 100 lb.	H. Oat-hay per 100 lb.	J Potatoes per bag	K. Tobacco (Boer Roll) per lb.	L. Beef per lb.	M Mutton per lb.	N. Fresh Butter per lb.	O Eggs per doz.	P Cattle, Slaughter.	Q. Sheep, Slaughter
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d
Mossel Bay ...	0 13 0	0 16 6	0 12 0	0 9 0	...	0 6 0	0 16 0	0 7 6	0 16 0	0 1 0	0 0 9	0 0 9	0 1 6	0 1 6	...	...
Pietermaritzburg Natal	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Port Alfred	...	...	...	0 12 0	...	...	...	...	0 8 0	...	...	0 0 8	0 1 6	0 3 0	...	...
Port Elizabeth ...	0 10 6	...	...	0 10 0	...	0 6 0	...	0 6 6	1 2 6	...	...	...	0 1 6	0 3 3	...	...
Queen's Town ...	0 11 3	0 16 0	0 11 3	0 8 6	0 4 0	0 3 0	0 14 0	0 8 0	0 8 0	0 2 6	0 0 8	0 0 7	0 1 6	0 2 6	...	...
Tarkastad ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Vryburg ...	0 16 0	1 1 0	0 17 6	0 12 6	0 5 0	...	0 18 0	1 1 0	1 6 0	0 1 6	0 0 10	0 0 10	0 3 6	0 5 0		...
Worcester ...	0 11 6	0 13 0	0 12 0	0 10 0	0 11 0	0 9 0	0 12 0	0 7 0	0 13 6	0 1 0	0 0 9	0 0 8	0 1 9	0 2 6	£12 to £15	1 4 0

NOTE.—Returns have not been received from the Civil Commissioners of Clanwilliam, Cradock, Graaff Reinet, King William's Town and Tarkastad.

THE

Journal.

No. 9. THURSDAY, APRIL 24, 1902. VOL. XX.

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EDITORIAL NOTES.

Next in importance to the divine profusion of water, light and air, those three great physical facts which render existence possible, may be reckoned the universal beneficence of grass. Exaggerated by tropical heats and vapours to the gigantic cane congested with its saccharine secretion, or dwarfed by polar rigours to the fibrous hair of northern solitudes, embracing between these extremes the maize with its resolute pennons, the rice plant of southern swamps, the wheat, rye, barley, oats, and other cereals, no less than the humbler verdure of the hillside, pasture and prairie in the temperate zone, grass is the most widely distributed of all vegetable beings and is at once the type of our life and the emblem of our mortality. Lying in the sunshine among the buttercups and dandelions of May, scarcely higher in intelligence than the minute tenants of that mimic wilderness, our earliest recollections are of grass; and when the fitful fever is ended, and the foolish wrangle of the market and forum is closed, grass heals over the scar which our descent into the bosom of the earth has made, and the carpet of the infant becomes the blanket of the dead.

As he reflected upon the brevity of human life, grass has been the favourite symbol of the moralist, the chosen theme of the philosopher. "All flesh is grass," said the prophet; "As for man, his days are as grass," sighed the troubled patriarch; and the pensive Nebuchadnezzar, in his penitential mood, exceeded even these, and, as the sacred historian informs us, did eat grass like an ox.

Grass is the forgiveness of nature, her constant benediction. Fields trampled with battle, saturated with blood, torn with the ruts of cannon, grow green again with grass, and carnage is forgotten. Streets abandoned by traffic become grass-grown like rural lanes, and are obliterated. Forests decay, harvests perish, flowers vanish, but grass is immortal. Beleaguered by the sullen hosts of winter, it withdraws into the impregnable fortress of its subterranean vitality, and emerges upon the first solicitation of spring. Sown by the winds, by wandering birds, propagated by the subtle horticulture of the elements which are its ministers and servants, it softens the rude outline of the world. Its tenacious fibres hold the earth in its place and prevent the soluble components from washing into the wasting sea. It invades the solitude of deserts, climbs the inaccessible slopes and forbidding pinnacles of mountains, modifies climates, and determines the history, character and destiny of nations. Unobtrusive and patient, it has immortal vigour and aggression. Banished from the thoroughfare and the field, it bides its time to return, and when vigilance is relaxed, or the dynasty has perished, it silently resumes the throne from which it has been expelled, but which it never abdicates. It bears no blazonry of bloom to charm the senses with fragrance or splendour, but its homely hue is more enchanting than the lily or the rose. It yields no fruit in earth or air, and yet should its harvest fail for a single year, famine would depopulate the world.—JOHN J. INGALLS.

In this Colony, as elsewhere, grass in the form of noxious weeds has failed to become a paramount evil. Instead of every bit of farm and garden land being overwhelmed through the expansion of the grassy dominion depicted by John J. Ingalls in the foregoing paragraph, grass is kept well within control—not by any means entirely owing to the mind and methods of Cape man himself but largely aided by those elements in nature which are opposed to the complete dominion of any portion of her empire over another. And so, as an instance of this countervailing influence, we venture to print a *résumé* at page 514 of an article in reference to birds as weed destroyers. And that is all we intend to do, because we want to remain friendly with the farmer and the native chieftain, for whose sjamboks and knobkerries we have a wholesome respect. We will just venture to poke our head a little way into danger by saying that many of the birds referred to are kindred in species to our veld and bush birds, and the same may be said of the weeds.

Touching the subject of hard words, botanical proper names especially, we are reminded by the article on weed destroying birds, referred to above, in which there are the proper names of both birds and weeds, of the oft-repeated remark (usually addressed to us by busy or lazy readers) that we should stick to vernacular or common names. But here is a distinct case in point for the use of proper names. We have scarcely any common or vernacular names, and as we have not, it is reasonable that people should use the proper names, which are just as easy as those manufactured by this ignoramus and the other. The line must be drawn as to such names, thus : if the vulgar or vernacular name has found its way into literature, let it stop and be used. No one would want to call a daisy a *Bellis perennis* or a dandelion *Leontodon Taraxacum*. But suppose we are in a new country, the weeds *can't* have English names because they—the things themselves—are not English. The only thing to be done is to use the botanical name, which course has three distinct advantages: 1. It is correct and accurately distinctive, incapable of being mistaken for something else or having two or more things confounded under it. 2. It is *exactly* understood by everybody acquainted with a little botany, whether English, French, German, Russ, Pole, Italian, Portugee or Spaniard. 3. It is easier to say than most vernacular names.

The National Sheep-Breeders' Association have notified the Agricultural Department that the Third International Conference of Sheep-Breeders will be held at Carlisle, England, on 5th July next, when a paper will be read, followed by a discussion, on "The Deleterious Effect produced by the Use of Substitutes for Wool in the Manufacture of so-called Woollen Articles in England, America, and on the Continent; their Injurious Effect on the Prices of Wool and the Desirability of Legislation to prevent the Sale of such Goods as Woollen Goods." The Association invites representatives from this Colony to the Conference, at which it is anticipated that most of the principal Sheep Societies and Wool Growers' Associations in the world will be either directly or indirectly represented. Any person intending to be present at the Conference should send his name and address to the Secretary, Walter Wm. Chapman, Esq., Room 32, Fitzalan House, Arundel Street, Strand, London, W.C.

Probably very few of our readers have missed the perusal of the whole or part of Mr. Willcocks' Report upon Irrigation for South Africa which to-day finishes its course through our pages. We are aware that it has been a source of study to many of our farmers and engineers. Mr. Frederic Franks of Sundays River has gone so far as to prepare plans showing the probable headworks, canals and channels supposed to be comprehended by Mr. Willcocks. These plans show so clearly the country that is embraced in the scheme, that we publish them in this issue. We invite correspondence upon this important subject, and we will publish any comments or criticisms that may be suitable.

The late Mr. J. P. de Waal.

When the late Mr. De Waal, last year, placed his resignation in the hands of the Minister for Agriculture, he wrote: "The struggle between my conflicting sentiments is over, I have taken the plunge, and will ere long say good-bye to the scene of my hard but fascinating labours during the past ten years. May I ask that my attached letter of resignation be handed over to my respected chief." And his *confreres* found it hard to part with him, for he was to them the head and front of their profession and their genial friend. But, recognising that he was entering a path that probably led to the well-being of the country at large, and feeling assured of his capable advice in the future, his departure from Constantia was regarded with less dismay than if he were leaving the country. The brief cable message from the British Consulate at San Francisco merely saying, "De Waal dead, tramway accident," intimates the untoward termination of a useful journey and a life that was to be devoted to the land of his birth. All who knew him were grieved, and the whole community has felt the shock of a calamity. He was born at Stellenbosch, and educated at the Agricultural School in that village. He has advanced well in the public esteem ever since, ten years ago, he went to the Government Wine Farm at Groot Constantia, where for nearly the whole time he fulfilled the duties of Manager.

Mr. De Waal last year came to the conclusion that the first and most important stage of the work he undertook at Constantia had been reached. There was no doubt that the wine produced at the Government farm was a success, and that everything had passed from the experimental stage into intelligent routine procedure.

Mr. De Waal had made it his business to cast aside all chance work in his labours, and to determine precisely the *modus operandi* which should be pursued step by step towards perfection. The results are the best testimony to the man's efficiency, and the object lesson that is contained within the boundaries of Constantia will reach far beyond, and be productive of great good to the community.

It is worthy of note that he determined the best seminal variety of the resistent Rupestris for the reconstitution of our vineyards. His variety Metallica is now accepted as the best of stocks, and it stands to his credit that he accomplished this purely by his own efforts, unaided by the skill of any European savant. This Metallica is thus of Cape origin, incepted and brought to perfection by a Cape viticulturist. There had been much said as to the frequent failure of the Hanepoot scions upon American stock. Here also it was with a similar keen observation that Mr. De Waal selected a seedling Rupestris which fulfils the requisite conditions of permanency, so far at any rate as ten years' experience may point thereto. The acquisition was welcomed by all horticulturists, and it was cherished as a Cape seedling, selected, brought to trial, and proved by Mr. De Waal himself at Groot Constantia. The multiplication of these two fundamental necessities for our viticulture has been going on under his skilled care from year to year with such speed that practically any reasonable quantity of the Metallica can be obtained, and of the Rupestris, reproduction is proceeding on similar lines.

There is, in short, gratification in the fact that the Government Wine Farm at Groot Constantia, under Mr. De Waal's direction, has solved for the wine-farming interest, first, the problem of manufacturing the best wine on certain ascertained lines independent of speculation; that it has given to it the much-sought, reliable Metallica Rupestris and Hanepoot Rupestris; that the advent of Mr. De Waal may be said to have ended forever the miserable blundering and failures which obtained prior to 1893, and that his successful *regime* introduced a new order of things that will prevail for all time.

Mr. De Waal retired from the management of the Government Wine Farm in order to begin what he conceived to be the second phase of his life-work as a wine farmer. This was, to carry out on a wholesale manufacturing scale, as a pure matter of commerce, the processes perfected at the model establishment at Constantia. He conceived that it was not sufficient to prove how the work could be done on a small scale. In his experience many of the farmers, when shown the Constantia results and urged to alter their traditional processes in accordance therewith, replied that the specialized model procedure at Constantia was all very well for that special establishment, but that these processes would not stand application to the rougher conditions of an ordinary wine farm. Now, it was precisely this excuse for a sluggish conservatism which Mr. De Waal desired to combat, by showing that upon a farm of the ordinary kind and under ordinary conditions of labour, and with a view to the market common to all wine farmers, the Constantia results could be obtained without let or hindrance anywhere.

Mr. De Waal put together in a brief and explicit form the experience he had gained at Constantia, as a text-book of practical details of vine-growing. This work has been published, as far as it was completed, in the *Agricultural Journal*. Hitherto, much that has been written on these matters has not been much more than a feeble compilation of current popular treatises in French or German, and the different conditions prevailing here have rendered their counsel of little value. The want of a Cape book for Cape vignerons, in which the suggestions shall be taken down from approved successful Cape practice, instead of borrowing from Europe and elsewhere, has long been felt, and the work compiled by Mr. De Waal on the subject will for long remain the *vade mecum* of Cape viticulturists.

Mr. De Waal had, since leaving this Department, visited the chief seats of the wine industry in other countries, had judged of their methods with those now approved here, and his aim was to give whatever light he might gain in the way of instruction to his fellow farmers. It was just on the eve of the completion of his tour that he met with his untimely end. Three interesting communications have reached the Agricultural Department from him while *en route*, and we publish them in this issue of the *Journal*.

We have taken this opportunity of placing on record the high estimate of the great services which he rendered to the Agricultural Department particularly and to the country generally. None so well as those who have been connected with him in his public duties can be aware of the rare singleness of purpose and devotion with which they were performed.

QUERIES AND REPLIES.

Kei Apple Trees.

I am thankful to say that, owing to your information and the explicit manner in which it was given, I have been able to get about 400 nice strong plants, which are now, on an average, about 4 inches high, but, as I am very badly off for water, and we are getting no rain and any amount of heavy wind, they are not making such headway as they did a little earlier. However, next year I shall be better prepared, and shall be able to take advantage of the experience already gained.

Abortion—After-effects in a Cow.

Is the fact of a cow having a whitish, stringy discharge a likely symptom of its being in calf, especially as having been very thin for a long time—two years—she has lately begun to improve, which improvement, however, has only taken place since I have been feeding slightly with bran mash each evening? Two years ago this June she slipped a full-grown calf, and did not clean nicely, as fourteen days after I pulled a lot of putrid stuff from her; and in making water ever since, and previous to my pulling that away subsequent to her slipping the calf, she makes a hoop of her back and takes a very long time to do it. As I had given up all hope of getting a calf from her again, and I have no knowledge of her having been to bull, I do not know what to think. I gave £40 for her in February, 1900, for her to calve, say, at the end of June that same year. Two months ago I began feeding her at night time, say 4 to 6 lb. each night.

W. H. Oliver.

I do not think that the whitish, stringy discharge from the cow to which the correspondent refers is any indication that she is in calf; on the contrary, I am of opinion that the white glutinous discharge from the vagina is merely the after-effects of the previous inflammation of the uterus caused by the prolonged retention of the putrid remains of the fœtal membranes following abortion. The difficulty and evident pain which she manifests when urinating is more difficult to explain, but it is most probable that the vagina was injured during the passage of the fœtus, the wounds became poisoned and inflamed by the absorption of septic matter, resulting in the narrowing, or some obstruction to the flow of the urine through the urethra.

I recommend a generous diet with a daily dose of a teaspoonful of powdered sulphate of iron mixed in a bran mash. Weak, astringent antiseptic mixtures are often injected into the uterus, and a very weak solution of permanganate of potash may be tried if the discharge continues. D. HUTCHEON.

Some New Tree Pests.

These pests made their appearance during the blossoming season, about beginning of September, and confined their attentions to the blossoms, eating the centre completely away. They are most active during the hottest part of the day. They entirely cleaned out my plums this season. I found them also on my apricot trees, but these latter escaped as they came into blossom much earlier than the plums (Kelsey) and had practically shed their blossom before the pests appeared. Plums and apricots were the only trees on which I had any blossoms this year, as the orchard is a new one, the trees being only three years old (all grafted, and imported from Pickstone, Cape Colony).

I cannot say if they feed on wild growth; there is very little of new wild growth at that time of the year in this country, as September is about the end of the dry season and everything is parched. There was plenty of long grass of previous season's growth around the orchard; they may have come from these, but I never found any on the grass. The farm has been in occupation only three years and the soil is practically virgin.

The blossoms sent you are plum blossoms (Japanese); I sent you all the specimens I had at the time. These beetles disappear about October. I did not notice any on the orchard before this year.

I will feel extremely obliged if you can give me a remedy for these pests. I did not get a single plum this year, and it seems such a pity, as the trees were simply covered with blossom. Plums seem to do very well inland, and indeed so do all fruit-trees, but until this destructive pest is got rid of, fruit-growing will mean a waste of time and money. M. H. NOLAN.

The specimen insects arrived rather badly broken and covered with powder from shaking about in the box, but quite enough remained to show that they were of the class of beetles known as Chrysomelids; I would not attempt to guess at their generic position. Coming as these do with the blossoms, there is not likely to be any more practical method of combating them than the fatiguing method of jarring them on to a cloth from which they can be thrown into water with a coating of oil, or knocking them on to the oil direct. Doubtless this beetle, like most of its class, is inactive during the cool of the day, especially in the early morning, and then drops readily when disturbed. It is not likely that the insect will prove a pest this way every year. Most of these insects are common for a year or two, and then so nearly disappear that they are almost forgotten before they again become numerous. Besides, recently established orchards on virgin soil in this country seem very much plagued during their first few years of existence, but afterwards gradually lose these drawbacks of infancy.

C. P. LOUNSBURY, Govt. Entomologist.

The Flea Beetle and the Vegetables.

Very many thanks for pamphlet on treatment of worms in domestic animals, which I hope will benefit my neighbours as well as myself. I am sending you by the same mail a few of the insects which destroy the young cabbage and other vegetable plants. The said insects are only destructive in the hot summer months, and during that period it is exceedingly difficult to raise young plants. From now till the Spring is well advanced they nearly all disappear and make no material difference to the young plants. They are rather difficult to capture on account of their activity, resembling fleas in that respect. I am enclosing two small leaves eaten by said insects.

J. W. VENABLES.

The subject of complaint is a species of dark blue Flea Beetle. Much towards minimizing the injury done by it may be accomplished by suppressing as far as possible such weeds in and about the garden as serve as food for the creature along with the cultivated plants, and by the use of methods of cultivation and fertilization of the latter plants as will cause them to make strong and rapid growth, thus carrying them safely through the period when they are liable to succumb. Advantage may be taken of the comparative sluggishness of the insects in the early morning to shake or jar them from the plants on to surfaces from which they can be easily gathered for destruction or on which they will be destroyed by contact. Both contact and poisonous insecticides are recorded to give good results against various species of flea beetles, and perhaps may be used to good advantage in the present case if the infested plants are numerous. The common fungicide, Bordeaux mixture, has been found to be distasteful to the creatures and they do little damage to plants sprayed with it. Paraffine emulsion is said to destroy the beetles at contact. The arsenites are used against them as stomachic poisons. Paris green is generally used because easily procured and generally safe so far as the plants are concerned. It is used in water at the strength of a pound to 150 gallons (which is about a moderate teaspoonful to a paraffine tin), or dry mixed with some finely ground substance as flour, in proportion of one part of the poison to twenty parts of the dilutent. The poisons had best, perhaps, be reserved for plants that are well up, as they might injure tender seedlings; the Bordeaux mixture might be tested for the latter.

C. P. LOUNSBURY, Govt. Entomologist.

AGRICULTURE.

Report on Irrigation in South Africa.

By Mr. W. Willcocks, C.M.G., M.I.C.E.

(Concluded from page 455.)

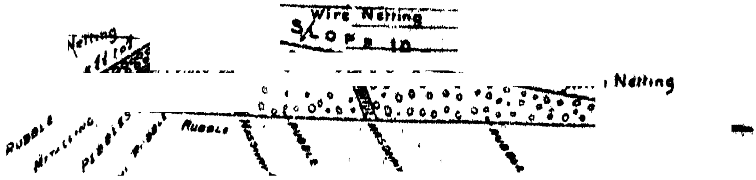
M. Hennebique, of Paris, would provide estimates and designs. He holds the patents for such work in every country in the world, I think. With dear labour, such as we have in this country, ferro concrete dams should prove a success. In a pamphlet I have published on the "Assuan Reservoir Dam"—(E. and F. N. Spon, London)—I have a design for a sluiced insubmergible dam by M. Hennebique, of Paris.

For insubmergible masonry dams, Rankin's well-known section is as good as any. For insubmergible masonry dams of 60 feet and under on the Orange and the Vaal, I should recommend the Betwa dam in India. The toe is kept well back from the wash of the water. For insubmergible masonry dams of 50 feet and under on ordinary rivers and creeks, I should recommend Rankin's section with the down-stream side built in steps.

For insubmergible masonry dams in narrow gorges, the best type to follow would be Mr. Schuyler's design for the Sweet Water dam (Schuyler's Reservoirs, page 126).

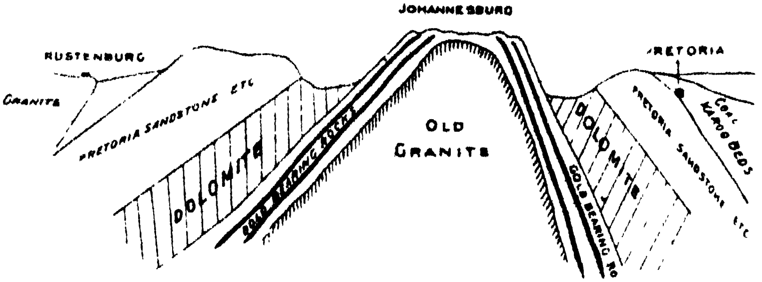
For insubmergible dams of 100 feet in height which are freely provided with under-sluices, I should recommend the Assuan reservoir dam on the Nile, or the ferro concrete dam designed by M. Hennebique, and already mentioned by me.

For ordinary submerged weirs in South Africa, with its plentiful supply of stone, I should recommend a modified type of the Kistna Weir. The stone pitching would be enveloped in strong galvanized wire netting, as shown in the section, and should prove itself as indestructible as good masonry, and as pliable as loose stone. The muddy waters of the rivers would staunch the up-stream section of the weir, while the down-stream section would stand the shock of the falling water.



THE DOLOMITE REGION OF THE TRANSVAAL.

The Transvaal may be most conveniently divided for agricultural purposes into the dolomite region, the high veld, the low veld, the bush veld, and the south-eastern tracts. Of these divisions, the most important in every respect is the dolomite region. It consists of the high plateaux on which the rain falls, of the belt of dolomite in which the water is stored, and out of which the springs have their birth; and of the sandstone and argillaceous rocks over which the water flows, and where it is principally utilised. Owing to displacement, the older rocks lie highest and the younger are less in altitude. The following diagram will explain.



The dolomite region may be said to embrace all the country within lines roughly joining Vereeniging, Heidelberg, Bethel, Pretoria, Rustenburg, Zeerust, Lichtenburg, Klerksdorp, and the Vaal River from Klerksdorp to Vereeniging. The area may be taken as 15,000 square miles. There is another considerable stretch of dolomite country in the Lydenburg District. The dolomite limestone itself is interspersed with thick belts of chart and also by dykes of intrusive rocks. In the presence of water, the dolomite limestone (which contains some 50 per cent. of magnesia) melts away and forms immense caverns and reservoirs, in which the rain water is stored. It will be noticed in the preceding sketch that the dolomite strata are depressed as compared with both the gold bearing conglomerates of Johannesburg and the sandstone and diabase of Pretoria and the Magaliesberg. This is owing to the fact that the dolomite degrades faster than the other two rocks. The water which has collected in the dolomite juts out in perennial springs of considerable magnitude, whose strength is not diminished in years of drought or increased by years of heavy rainfall. The reserves of water are perennial. The best known springs are those of Pretoria, the Klip and Mooi River sources south-west of Johannesburg, the Wonderfontein spring south of Krugersdorp and Steyn Kopjes at the sources of the Magalies River. These springs discharge, as a rule, between eight and twelve cubic feet per second. It may be remembered that the Karroo springs discharge four cubic feet per minute and the conquered territory 40 cubic feet per minute, while here we have springs of ten cubic feet per second. We have to go back to the dolomite springs in the Oudtshoorn District of the Cape Colony to find anything approaching these springs in magnitude.

Wherever the rivers discharge these perennial supplies we have areas of intense cultivation and considerable agricultural wealth, as in the valleys of the Klip and Mooi Rivers, at Irene and Pretoria, in the Hekpoort region of the Magalies River, at Rustenburg, in the Zwartruggens, and at Zeerust. Wherever perennial water is supplied we have orchards, broad stretches of arable land, tobacco plantations, and gardens, and a general well-being and prosperity which are rare in South Africa. As far as I have seen, the water is not used as economically as it is in the Cape Colony except on the Hex River near Rustenburg at a level of about 3,900 feet above sea-level. Small masonry or temporary weirs are built across the streams, and the waters are led off in water-courses which soon command a large area of land and irrigate flush. The duty of water may be taken as ranging from 150 to 250 acres per cubic foot per second. The principal crops are tobacco, orange, orchard, vegetable, second crops of potatoes, oathay and cereals. I have never seen any leguminous crops anywhere, though Mr. J. van der Byl, the enlightened owner of Irene farm, tells me that he has begun the cultivation of lucerne. Hail and locusts are specially dreaded by the farmers. Some farmers consider that destructive hailstorms may be expected once in ten or fifteen years, while others consider that the crops in one year out of four or five are considerably damaged. The thunderstorms in this region are very severe. Stony land under veld grasses may be considered as worth ten shillings per acre, and land under veld grasses but capable of growing Indian corn may be taken as worth £3 per acre. Perennially irrigated land may be taken as worth anything from £20 to £50 per acre.

Johannesburg has the best rainfall in the district, which may be taken as ranging from 28 inches per annum in the east to 22 inches in the west. The maximum at Johannesburg may be taken as 40 inches and the minimum 20 inches. The rainfall, as everywhere in South Africa, is very uncertain in September, October and November, while January, February and March can always be counted on. Water for all the superior crops is needed from May to December. Indian corn, potatoes, pumpkins and turnips can be sown and reaped without irrigation, and so also can side oats in most years. The country generally is capable of great agricultural development. The soil is rich and the rainfall generally abundant though misplaced. One may say that, owing to the rocky nature of the country, two-thirds of the area may never be fit for anything except veld grass, while the remaining third will be capable of agricultural development. The rainfall here is so good that each square mile of country may be considered as capable of supplying enough of water for reservoirs to ensure in years of drought 25 acres of perennial irrigation. This was the area irrigable in the best watered parts of the Orange River Colony. As the dolomite region stretches over 15,000 square miles, the total area capable of perennial irrigation may be taken as 850,000 acres, in addition to the areas irrigated by the existing springs. Reservoirs in the beds of the streams, or at the rocky gorges and passes in the hills, will be easily constructed by overflow dams some 50 or 60 feet high, as we have generally to do with hard rocks of great resisting power. If, however, rock could be sounded in the bed of the Hex River at the Oliphants Gorge, where the river traverses the Magaliesberg, it would be possible to close the gorge with a dam 200 feet high and turn the river over the nek and form a reservoir of great capacity with a catchment basin of 200 square miles of more or less rocky country. In this district reservoirs could be formed anywhere. Some local engineers, however, consider that when we were on dolomite strata the dolomite rock itself would be unsuitable for reservoirs, as the water would escape through the numerous clefts and caverns, and could not be captivated. It seems to me, however, that the many powerful springs in these districts prove that these are points where the waters are forced to come to the surface, and that if the waters of the springs were captivated in iron pipes and led through reservoir dams constructed on the rocks where the springs rise, we might not only store all the surface rain, but also all the spring water which to-day runs to waste for four months out of twelve. This latter point I consider of great importance. The slopes are generally not very great, and the storage capacities of the reservoirs would be considerable. Masonry dams of 100 feet in height might be built in especially good places, and rock and earth dams of fifty feet in height wherever a suitable site could be found. Not having levelled and surveyed any of the sites, I do not like to commit myself to any particular spot, but as I write I have in my mind at least a dozen sites, any one of which would have made an excellent location for a reservoir dam. With hard rock foundations and rivers such as the Crocodile and its tributaries and the Aapies and Elands Rivers, there will never be any lack of reservoir sites.

In addition, however, to the agricultural value of the perennially irrigated land, there is all the land which can be cultivated without the aid of irrigation in producing crops of Indian corn, pumpkins, potatoes, and root crops. I may say that in South Africa pumpkins are considerod excellent food for stock. Such lands need to be well ploughed to be sown in rotation with some suitable legumins, such as the Florida bean, suggested to me by Mr. Van der Byl, to be manured with suitable manures, and well hoed, to give excellent yields, even in years of deficient rainfall, for it must be always remembered that it has been proved again and again in India that well-manured and tilled crops need only half the rainfall which ill-manured and untilled crops require.

Valuable as water may be for agricultural purposes, it is a thousand-fold more valuable for gold washing at the Rand mines. The gold-bearing strata are singularly free from water, offering in this respect a marked contrast to the dolomite which lies just above them. As I understand, about seven cubic feet of ore yield £1. To wash out this gold there are needed ten tons of water for each ton of ore. A ton of ore may be taken as twelve cubic feet and a ton of water as 35 cubic feet. Of the water used, one-fifth is permanently lost and the remaining four-fifths are used again. From these data it results that forty cubic feet of water are needed to work out £1. Now in the dolomite region we may say that 150,000 cubic feet of water will be needed to irrigate one acre of land for one year, of which the nett yield may be taken as £5. In other words, in agriculture 30,000 cubic feet of water will yield £1, as against 40 cubic feet in the Rand mines. As the Rand mines are the principal source of wealth of South Africa, it is only reasonable that round Johannesburg all agricultural interests should yield to the gold-mining interests during the lifetime of the mines. Now the Rand mines produce £20,000,000 of gold per annum, and need 800,000,000 cubic feet of water per annum, or 25 cubic feet per second. Up to the present the water needed for the mines has been obtained partly from the mines themselves, partly from the numerous reservoirs on the steep sides of the hills round Johannesburg, where the most considerable reservoir dam is a 40-feet-high wall of masonry, partly from a well south of the Klip River, and partly from the Johannesburg Water Company. During years of deficit rainfall the mines are put to great difficulty to meet these demands for water, and sometimes they are put to considerable loss, while tens of thousands of workmen and plant lie idle. It is, moreover, contemplated to raise the output of the mines to £40,000,000 per annum. To increase the output certainly, and to ensure the present working of the mines even, it is considered essential by the Chamber of Mines, Johannesburg, that something should be done to ensure a permanent supply of water to the mines. Now, fortunately for Johannesburg, not only are the Karroo strata overlying the dolomite interspersed with thick seams of coal which can be delivered at the mines at eight shillings per ton, but the dolomite overlying the gold-bearing strata is full of springs. These springs lie between seven hundred and a thousand feet below Johannesburg, and from 15 to 30 miles from the Rand. They discharge between them about 40 or 50 cubic feet per second. If half the water of each spring were taken for the mines and the other half left for agriculture the quantity would suffice for the mines. The existing agriculture in the valleys fed by the springs would not, in the end, be allowed to suffer, even in area, because the losses could be compensated by digging suitable channels through the reedy marshes, which are to-day fertile sources of loss, and by gradually making suitable reservoirs for storing the waste water of the springs, and as much of the surface flow of the ground as was considered necessary. The agricultural wealth of the valleys would increase with the future increase of the wealth of the mines, just as in the past it has been more than quadrupled by the presence of the mines themselves.

It would, however, be necessary for the Government to declare all springs, rivers and torrents as public property, and legislate in the manner proposed by me at the beginning of this report. These just and highly expedient measures, which would seem harsh to sentimentalists, would be the truest kindness to the agricultural interests themselves. The prosperity and well-being of every interest, not only in the Transvaal, but in South Africa generally, will depend on the prosperity of the Rand, certainly for the next fifty years. Though my life has been spent in the execution of irrigation projects and the furtherance of agricultural prosperity, I feel that, under the special conditions prevailing in South Africa, the suggestion of any course other than the obvious one of first putting the Rand Mines on a sound footing as far as their water supply is concerned, would have constituted me a bigot. Ten acres of irrigable land in the Mooi and Klip River valleys with Johannesburg in the full tide of prosperity will yield as good a rent as forty acres with Johannesburg in decay.

The high veld consists of undulating plains of grass with a few hills rising out of the general level. If one were to imagine the Midlands of England without fences, without fields or trees, and without homesteads or villages, one would have a good idea of this veld. The country lies between 4,700 and 5,700 feet above sea-level and experiences very cold and dry winters. The average rainfall may be taken at 21 inches, of which much the greater part falls in the months of January, February and March. The springs are generally feeble. The veld grass is good and capable of supporting one sheep per acre.

The high veld lies to the east of the dolomite region, and may be said to be enclosed by lines drawn roughly from Vereeniging to Heidelberg, Pretoria, Belfast, Amsterdam, Vryheid, Volksrust, Standerton, and the line of the Vaal River.

Indian corn, potatoes, roots, and side oats can be grown without irrigation, but to produce good crops and to make them as independent as possible of the uncertain rainfall the ground should be well manured and tilled. All good agriculturists make this an essential condition of success. I should add that suitable legumins should be grown in rotation.

I think that one might say that half the high veld could be put under the above crops without irrigation. This is a very high proportion and will not be attained for many generations, but the land generally is good. The soil consists of a light reddish loam with occasional patches of dark and heavy soil.

All along the high veld I think it would be more profitable to thoroughly develop the unirrigated crops than to go in for perennial irrigation. The higher the altitude in South Africa the less is the value of perennial water, except under special conditions. The farms and homesteads should certainly have suitable reservoirs and dams. An ordinary valley in the high veld will store 70,000,000 cubic feet of water with a dam 25 feet high costing some £10,000. Now

70,000,000 cubic feet of water will irrigate at this altitude 450 acres, which will be worth about £10,000, so will scarcely pay, and larger dams which will pay well will be beyond the means of any but the larger properties or the possessors of very well-situated reservoir sites, especially near the towns. There are, doubtless, many reservoir sites in this large area of 20,000 square miles which would give better results than the typical reservoir described by me. A square mile of catchment basin might be counted on for 4,000,000 cubic feet of water and 25 acres of perennial irrigation even in years of drought.

The valleys of the Vaal and Oliphants Rivers may have the same remarks applied to them as I have already applied to the rivers in the north-eastern half of the Orange River Colony, to which reference should be made.

At Middelburg I had the pleasure of conversing with Mr. Pink, a very successful agriculturist in the neighbourhood. He told me that on his land he had a spring with which he could irrigate 70 acres of land, and that any farmer on the high veld could afford to pay £1 per acre for perennial water. He considered onions a very suitable crop if well tilled, and potatoes manured with kainit equally profitable. The soil was particularly deficient in lime in his opinion. On the damper slopes and in the valleys, he thought that lucerne would grow without irrigation, but could not survive years of drought like 1889. Like Mr. Van der Byl, of Irene, he considered that steam ploughing had a great future before it, especially as coal was cheap. Indeed, when I compared the notes of the conversations with Mr. Pink and Mr. Van der Byl, I was pleased to see that these two practical farmers had almost identical views. Market gardening in Middelburg, with the aid of the small perennial spring discharging half a cubic foot per second, resulted in very high profits. In all centres like Middelburg, Standerton, and other towns, reservoirs and perennial irrigation would give handsome profits, and to such places perennial irrigation should at first/be confined.

The farmers of the high veld all trek to the low veld in winter but if sufficient winter food crops were grown with the aid of the rainfall, and the stock herded in winter in cattle and sheep folds sheltered by groves of trees, it would be possible to dispense with this annual trek, as has been proved by advanced farmers.

THE BUSH VELD AND THE LOW VELD.

The bush veld lies to the north of the dolomite region, and the low veld lies to the north and east of the bush veld and the high veld. They cover some 60,000 acres. These low-lying areas are traversed by comparatively high ranges of hills, as the Zoutpansberg, the Drakensberg, the Lobombo, and others, but the low lands cover by far the greater part of the area. The bush and low veld may be considered as the lands lying generally below 4,000 feet above sea-level and north of the 26th degree of latitude. These lands are, as a rule, capable of producing tropical crops wherever irrigation can

be secured. They are generally covered with scrub and grass, and are feeding grounds of the flocks and herds of the Boers during the winter months. This practice of trekking from the high veld to the low veld in winter is due to the fact that the winter frosts kill the grass in the high veld, and as the Boers have not, as a rule, sown any root crops or pumpkins or side oats on their lands in the high veld, they are compelled to travel down to the regions where frosts are unknown. I have, however, been informed by advanced Boer farmers that the trekking results in 10,000 acres of veld having to do the work of 5,000. If suitable crops for feeding stock were sown with the aid of the rainfall on the high veld, and the cattle and sheep folds built between belts of blue gums or pines, it would be a distinct advantage to the farmers, and double the value of their holdings in the high veld. The winter in South Africa is not as severe as the European winter. The only thing needed on the high veld is the planting of a few belts of trees, which grow with great rapidity, and the cultivation of roots and feeding stuff for the flocks and herds.

The low veld itself is generally well supplied with water and capable of being extensively irrigated, and as it can produce many of the valuable tropical plants, it should be a possession of great value. It has, so far, lain undeveloped, owing to the climate being unsuitable for Europeans. Europeans cannot live and work in the climate, while British-Indians, who could live and develop the country, have not hitherto been allowed to enter. The Kaffir is not a worker and developer of anything. He will never learn from the European, for the European in South Africa does not work with his hands, but he will learn from the Indian. If a hard and fast line were drawn between those regions where the European can work and live, and those where the Indian could reside, and the latter area thrown open to Indians and Kaffirs, who would have the power of becoming owners of the land with full proprietary rights, we should soon convert the low veld into a country capable of paying substantial taxes. It would be necessary for the Government to impose a very light tax on the whole area, say one penny per acre per annum for the first year; two pence per acre per annum for the second, third and fourth years; three pence per acre per annum for the fifth, sixth, seventh, eighth and ninth years; and finally four pence per acre per annum for the next ten years, with a final maximum which would be fixed by a Commission appointed for the purpose. This healthy innovation would have as its first result the throwing back into the hands of the Government of large tracts of country which to-day are a useless possession to the people who own them. Such people have no intention of developing these lands and are practically nothing but paper landowners. In a few years the proprietors of the lands would have handed back to the Government all the lands they did not care to or could not work, and would have retained and begun developing all the lands they could develop. With these lands in its possession, the Government would invite British-Indians and Kaffirs, and make a beginning of settling the country. In this way only do I think that it would be possible to make these extensive tracts in the Transvaal not only self-supporting, but a source of appreciable revenue to the country. When the tide of Indian immigration had set in, projects for irrigation and further improvement of the land might be undertaken. The low veld could produce rice and tropical plants, and would in no way compete with the temperate and sub-tropical crops of the European farmers on the high veld and dolomite regions.

Indeed, if Indians and Kaffirs were confined to the tropical belts, and the Europeans to the temperate belts, we should not see the absurd spectacle, which we see to-day, of the best parts of the temperate zones being inhabited almost exclusively by Kaffirs, while the Europeans with great jealousy were keeping the Indians and Kaffirs out of the tropical belts.

THE SOUTH-WESTERN CORNER OF THE TRANSVAAL.

This tract lies to the south-west of a line joining Lichtenburg and Klerksdorp, and may be called the Bloemhof District. It covers some 10,000 square miles, and may be said to be some 4,000 feet above sea-level. It is traversed by a few hills, but is generally level, and consists of a light sandy loam. The veld is covered with grass. The Hartz River flows through the middle of it, and the Vaal River forms the southern boundary. The rainfall may be taken as 18 inches per annum. According to Mr. St. Vincent Erskine, who knows the district intimately, all crops except Indian corn need irrigation, and Indian corn cannot be counted on when the rainfall is late, as the early frosts destroy it.

I regret that I had no opportunity of visiting this country owing to its disturbed state, but from its position it partakes of the character of the northern two-thirds of the south-western half of the Orange River Colony, to which reference should be made.

PROPOSED LAND TAX AND WATER RATES.

With the exception of the single reference to land taxation under the heading of the "Bush Veld," I have so far said nothing on the subject of Land and Water Rates, and yet no wholesale improvements are possible in arid and semi-arid countries without land and water taxes of some kind. Without taxation an individual may possess a million acres of land and do nothing to improve it with perfect impunity. Others are prevented from improving it, the State cannot interfere, and whole regions lie waste and barren. All Eastern Governments have realised this, as they have generally to do with regions where Nature does so little and human beings have to do so much. Europe with its wonderful climate differs generally from this rule. In South Africa, however, the Government must follow the precedent of the arid and semi-arid regions of the world if it wishes to ensure success.

There is scarcely any part of South Africa where agriculturists cannot afford to pay £1 per acre per annum for perennially irrigated land. It may be considered that a spring is capable of irrigating 150 acres per cubic foot per second, or 2½ acres per cubic foot per minute. It would be perfectly fair for the State to put on every perennial supply of water a tax of £2 10s. per cubic foot per minute, whether the irrigation were flow or lift. If the water was supplied by a natural spring or by an artificial reservoir created by the Government, it would be taxed equally. Artificial reservoirs constructed by private parties would not be taxed. The perennially irrigated lands might be taxed instead of the water supplied, but the taxing of the water supplied would encourage economical usage and has much to recommend it. Judging from the springs I have seen and the area on which they operate, I should say that the natural springs of the Transvaal would bring in a yearly revenue of from £150,000 to £200,000 per annum, which could be easily paid. The springs in the Orange River Colony would not bring in a tenth of this revenue. Artificial irrigation provided by reservoirs and canals from borrowed capital would bring a handsome direct revenue in these countries as it does in India. The indirect revenue would be a material gain to the Government of no inconsiderable amount. A uniform rate of £1 per acre per annum for perennial irrigation would enable extensive projects to be undertaken everywhere.

PROPOSED BUREAU OF AGRICULTURE.

We have so far considered water rates. We now come to the question of the land tax quite independent of the water tax. The land in the Orange River Colony may be considered as having a mean value of 15s. per acre. Such land could pay an annual land tax of 6d. per acre per annum. It would be resented at first, but it would result in an elimination of useless landholders, and a substitution in their place of men who were determined to work their lands to the best advantage. The growing importance of the poor white question will, in the end, force the hand of the Government if nothing is done now. On a basis of 6d. per acre per annum the Orange River Colony could pay £300,000 per annum. The taxation might be introduced gradually, but if the country is ever to be developed there must be some systematic taxation which will not allow worthless landlords to accumulate land. In the dolomite region, the high veld, and the south-eastern corner of the Transvaal, land may be taken as worth 10s. per acre. Such land should pay 4d. per acre, and would bring in a yearly tax of some £350,000 per annum. Here, again, irrigation works would add to the revenue as in the Orange River Colony.

For the bush veld, capable of great development and yet quite undeveloped, special taxation would have to be devised as already proposed under the heading of "The Bush Veld."

The United States of America are considered the least paternal Government in the whole world, and yet winter after winter I have seen Egypt visited by capable and keen Americans representing the Agricultural Bureau at Washington, who collect information of every kind about agriculture and send home good specimens of every kind of agricultural produce. These seeds are sown on the experimental farms of the different States, and if any variety proves itself well-suited to any particular region, the farmers are immediately informed and provided with seed corn. Not only are agents sent to Egypt but to every interesting agricultural country in the world, and in this way the States keep at the head of the world in agricultural production. Such a bureau might be established for South Africa with great benefit to the agricultural community. The South African agents would bring back with them legumins from Egypt, suitable products from other arid and semi-arid countries, and, above all, labour-saving machines from America. In this way life might be imparted to agriculture in this country, while labour-saving machines would halve the expenditure on water-courses and earthwork of all classes.

The same bureau would in South Africa itself attend to rain gauges, discharges of streams, value and extent of crops, and every kind of information necessary for forming a just appreciation of the agricultural values of different parts of the country.

CONCLUSION.

Knowing well the interest Your Lordship takes in the agricultural development of South Africa, I have been emboldened to write at great length and very fully on the irrigation possibilities of the three Colonies which I have travelled through. A perusal of the report will, I feel confident, have convinced Your Lordship that, with the exception of the south-west corner of the Cape Colony, the "conquered territory" of the Orange River Colony, and the high veld of the Transvaal, the agricultural development of the whole country depends entirely on irrigation. The high-lying plateau of South Africa has a rainfall suited to tropical countries, and a climate which belongs to a temperate zone. The autumn rains of February and March, which are monsoon rains, would, in a country like India, be of infinite value; but followed, as they are in South Africa, by a severe and biting winter, they are of little value indeed for agricultural purposes. The long winter and spring drought and the uncertain summer rains absolutely prohibit agriculture of any advanced kind.

In about four-fifths of the Cape Colony, and in one-half of the Orange River Colony, no crops can be grown without irrigation if there is to be any certainty of reaping a harvest. In one-fifth of the Cape Colony, half the Orange River Colony, and two-thirds of the Transvaal, Indian corn, potatoes, roots generally, and pumpkins, for feeding stock in winter, can be grown with the aid of the rainfall and matured in all but years of heavy drought. In these more favoured tracts an intelligent application of crop rotations, suitable manures and good tillage would do much for the country, and in ten years out of eleven suffice for an agricultural development of no mean value, especially if taken in conjunction with stock breeding, which will always be the principal industry of the country. But even in such tracts the unfailing recurrence of famine in India has taught us that in countries where the rainfall is by nature tropical and confined in great part to a few months of the year, there is no insurance other than perennial irrigation. If such is the case in the best favoured parts of South Africa, what shall we say of the rest of the country, when year after year millions of cubic feet of water roll away uselessly to the sea. The water comes when it is of no value, and is absent when it would be worth untold gold.

The extraordinary fertility of all those localities where nature has provided springs of perennial water, and where the farmers have been able to utilise it, in spite of the laws which are as harassing as they are ridiculous, points the way to the true road where lies the permanent regeneration of South Africa. We have only to imitate nature and impound on the surface of the ground the same water which she stores in caverns and fissures, and we have put the permanent prosperity of the country on a sound basis. The Kenilworth Oasis within a few miles of Kimberley, irrigated by the refuse water of the diamond mines, is a sure guarantee of what even inferior water can do with the rich soil and climate of South Africa.

In connection with this question, it is fortunate that nearly everywhere in the Transvaal, in the greater part of the Orange River Colony, and over wide areas of the Cape Colony, the rainfall is sufficient in quantity in even the very worst years to allow of the storage of water on a very large scale. On a rough calculation I should say that with the aid of its rainfall and the Orange River, the Cape Colony should be able to ensure the perennial irrigation of 1,000,000 acres, the Orange River Colony of 750,000 acres, and the Transvaal of 500,000 acres in the high-lying regions where Europeans can live and work, and 1,000.000 acres in the low tracts which should, I think, be thrown open to our fellow British-Indian subjects. On this latter point I have written fully elsewhere and shall say nothing further here.

South Africa with an additional 3,000,000 acres of perennially irrigated land gained at an expenditure of £30,000,000. and valued at £100,000,000; and also with 10,000,000 acres of land under crops depending on rainfall, which might be valued at another £100,000,000, would be a very different country from that which it is to-day. An addition of £200,000,000 to the permanent wealth of South Africa would enable the country to contemplate with serenity the dark days of its gold and diamond industries. Without such agricultural wealth to lean upon, the exhaustion of its mines will plunge the whole country into conditions of poverty which no statesman can contemplate without dismay, certainly no statesman of Your Lordship's ability and proved devotion to the welfare of the South African continent.

Birds as Weed Destroyers.

Birds among farmers have a bad name in Cape Colony and there are plenty of proofs of bad conduct. It is therefore like pleading a lame cause to say anything for the habits of birds. There are, however, among us many close observers who have noticed that birds destroy weeds and insects. The following *resumé* of an articlein the Government Year Book of the U.S. of America on the subject of birds as weed destroyers throws some light upon the subject.

SEED-EATING BIRDS.

Seed-eating birds flock in myriads to agricultural districts and live upon the ripened seeds of weeds which they attack in the most critical stage of life, the seed period; thus it follows that their services must be of enormous value. Their good work practically extends from early autumn until late spring. It is not at all uncommon in America for a crow blackbird to eat from 30 to 50 seeds of noxious weeds, or a field sparrow 100 of such seeds, at a single meal. In the stomach of a sparrow were amaranth, and in another 300 seeds of another weed, and a tree sparrow had consumed 700 seeds of a rank grass seed. The birds most actively engaged in consuming weed seed are sparrows and finches, including more than 1,000 species.

SPARROWS AND FINCHES.

The intimate association of sparrows with agricultural interests has suggested the importance of a careful enquiry as to their food habits, and such an investigation, based on field observations, and an examination of the contents of stomachs in the laboratory, is now being made in the Biological Survey, in America. Sparrows have been collected in practically all the States and in Canada, and some 4,000 stomachs have been examined. The results show that during the colder half of the year the food of these birds consisted almost entirely of the seeds of weeds.

The native sparrows might be suspected of injuring crops; but though they frequently sample grain in stubble fields they have not, as yet, been found guilty of committing serious depredations. In order to compare the grain-eating propensities of various species, specimens were collected in a field a few miles south of Washington, before and after the wheat was cut. Of nineteen native birds, sparrows, only two had eaten grain, and these had taken only one kernel each, while every one of the five English sparrows had gorged with wheat.

In 1894, English sparrows were observed destroying dandelion seeds in Cambridge, Mass., and during the last three years in the public parks of Washington. In order to determine how much damage was done to dandelions on the lawns of the Department of Agriculture, every flower stalk was picked from a rectangular space 6 feet 2 inches long, by 3 feet 3 inches wide. Of the 418 stalks collected, 358 showed unmistakable marks of the sparrow's bill. On the next day 293 stalks were gathered from a circle 2 feet in diameter on the other side of the lawn, and 275, or 93 per cent., proved to be mutilated. These and similar observations seem to show that at least three-fourths of the dandelions are mutilated by birds.

In the destruction of dandelion seeds the English sparrow is aided by several native birds of the sparrow species.

Among the weeds which are troublesome in fields, especially among hoed crops, may be mentioned ragweed (*Ambrosia artemisiæfolia*) several species of the genus *Polygonum*, including bindweed (*P. convolvulus*), smart-weed (*P. lapathefolium*) and knotweed (*P. aviculare*), pigweed (*Amarantus retroflexus* and other species), nut grass and other sedges (*Cyperaceæ*) crab grass (*Panicum sanquinale*), pigeon grass (*Chætocloa virdis* and *glauca*), lamb's quarters (*Chenopodium album*) and chickweed (*Alsine media*). Nearly all of these weeds are annual, not living over the winter, and their seeds constitute fully three-fourths of the food of a score of native sparrows during the colder half of the year. Professor F. E. L. Beal, who has carefully studied this subject, examined the stomachs of many tree sparrows and found them entirely filled with weed seed, and concluded that each bird consumed at least a quarter of an ounce daily. Upon this basis he calculated that in one State the tree sparrow annually destroys about 1,750,000 pounds, or about 875 tons, of weed seed during its winter sojourn.

Besides tree sparrows and juncos, the most important gregarious sparrows that destroy weeds in the Mississippi Valley and on the Great Plains are the fox sparrow (*Passerella iliaca*), snowflake (*Passerina nivalis*), the white-crowned sparrow (*Zonotrichia leucophoys*), Harris's sparrow (*Zonotrichia querula*), and longspurs (*Calcarius lapponicus, C. ornatus, C. pictus* and *Rhyncophanes mccownii*). Farther south are found lark finches (*Chondestes grammacus* and *Chondestes grammacus strigatus*), while on the Pacific slope occur Nuttall's sparrow (*Zonotrichia l. nuttalli*), the golden-crowned sparrow (*Zonotrichia coronata*) and Townsend's sparrow (*Passerella ilicaca unalaschensis*).

On a farm in Maryland, sparrows and juncos swarm during December in the briers of the ditches between the corn fields. They come into the open field to feed upon weed seed, and work hardest where the smart weed forms a tangle on the low ground. Later in the season the place was carefully examined. In one cornfield near a ditch, the smart weed formed a thickset over three feet high, and the ground beneath was literally black with seeds. Examination showed that these seeds had been cracked open and the contents removed. In a rectangular space of 18 square inches were found 1,130 half seeds and only two whole seeds. A search was made for seeds of various weeds; but so thoroughly had the work been done that only half a dozen seeds could be found. The birds had taken practically all the seed that was not covered; in fact, the song sparrow and several others scratch up much buried seed.

The chipping-sparrow (*Spizella socialis*) is recognised by its reddish cap, and habit of lining its nest with horse-hair. It eats the seeds of troublesome grasses, and these and other weed seeds make up three-fourths of its food.

The field sparrow (*Spizella pusilla*) is closely related to the chipping-sparrow, but may be distinguished by its reddish bill. It is thoroughly commonplace in appearance, and in habits is much shyer than the chipping-sparrow, which is often called a dooryard bird. Field sparrows are very abundant about the farm, and their food consists of practically the same seeds as those eaten by its relative.

The grasshopper sparrow (*Ammodramus savannarum passerinus*), so called from its dry, monotonous note, is even more a bird of the fields than the field sparrow. It is one of the few species that eat the seeds of rib grass (*Plantago lanceolata*). The dickcissel (*Spiza americana*), of the Central States, which also has an insect-like note, is larger than the grasshopper sparrow, and its plumage is conspicuously marked with bright yellow, black and grey, somewhat like that of a meadow lark. The lark finch (*Chondestes grammacus*) is also a large sparrow of striking appearance. Its head is striped with black, and from this fact it is known in certain sections as "snake bird." It is particularly fond of the seeds of leguminous plants. The vesper sparrow (*Poœcetes gramineus*), celebrated for its twilight chanting, is as much a bird of the open grassy field as the lark finch or dickcissel. When disturbed it flits up from the ground, spreading its white-splashed tail, and alights but a short distance away to resume it work. However varied in dress or habit, all the native sparrows are alike in subsisting largely upon seed of noxious plants.

The goldfinch (*Astragalinus tristis*), or wild canary, is as useful as it is beautiful, and as a weed destroyer has few equals. It confines its attention very largely to one family ot plants, the Compositæ, and is especially fond of thistles and wild sunflower. It is so often seen on thistles, that it is commonly known as the thistle bird. Near Washington, a flock of a dozen birds was seen during the latter part of August feeding upon sunflowers that had escaped from cultivation, and in the Central and Western States the goldfinches do much good by eating the seeds of wild sunflowers and other closely related weeds. They have also been seen feeding upon wild lettuce (*Lactuca spicata*), and probably eat prickly lettuce (*Lactuca scariola*), which has proved the most rapidly spreading weed ever introduced into this country, but as yet no actual observations as to the latter food habit have been made. Stomachs collected in August were filled with seeds of Compositæ, mostly sunflowers (various species of *Helianthus*) and thistles (*Carduus lanceolatus* and other species).

At Burlington, goldfinches were found feeding exclusively upon the bull thistle (*Carduus lanceolatus*). A dozen of the birds were killed, and their gizzards and gullets were found literally crammed with thistle seeds. At Sing Sing, goldfinches have been seen eating the seeds of the Scotch thistle (*Onopordon acanthium*) and boneset (*Eupatorium perfoliatum*). Cone flowers (*Rudbeckia hirta*), prairie sunflowers (*Gaillardia*), evening primroses, catnip, elephant's foot (*Elephantopus* sp.) and mullein also form part of their food, and late in the season they turn their attention to ragweed and consume great quantities of the seeds of this troublesome species.

The pine siskin (*Spinus pinus*) and the redpoll linnet (*Acanthis linaria*) are two drap-gray birds related to the goldfinch, which feed largely upon the seeds of conifers, sycamores, birches and alders, but also descend to the ground to eat weed seed. In winter they feed upon sow thistles (*Sonchus oleraceus*), field asters (*Aster* sp.) and golden-rods (*Solidago* sp.). The redpoll linnet is known to destroy mullein seeds (*Verbascum thapsus*), and the pine siskin is often seen consuming quantities of seeds of chickweed (*Alsine media*), lamb's-quarters (*Chenopodium album*) and ragweed (*Ambrosia artemisiæfolia*).

The grosbeaks likewise have been insufficiently studied. The evening grosbeak (*Coccothraustes vespertinus*) and the rose-breasted grosbeak (*Zamelodia ludoviciana*) are known to eat seeds of ragweed, and the blue grosbeak (*Guiraca cærulea*) feeds upon a variety of weed seeds. The cardinal grosbeak (*Cardinalis cardinalis*), or redbird of the south, is abundant along hedgerows and briery tangles adjoining farms, and during the winter months does good work by feeding upon the seeds of such noxious plants as ragweed, pigeon grass, bindweed and smartweed.

SUMMARY.

Fifty different birds act as weed destroyers, and the noxious plants which they help to eradicate number more than threescore species. Some of these plants are much more in favour than others, while several are almost universally sought after. During the colder half of the year food is furnished for many species of birds by well-known and widely distributed weeds.

Blackbirds, the bobolink, the dove and the English sparrow are of grain-eating proclivities, but do much good by consuming large quantities of weed seed.

Shore larks and grosbeaks also render considerable service, while the meadow lark is even more beneficial. Goldfinches destroy weeds which are not touched by other birds, confining their attacks chiefly to one group of plants (the Compositæ), many of the members of which are serious pests.

But the birds which accomplish most as weed destroyers are the score or more of native sparrows that flock to the weed patches in early autumn and remain until late spring. During cold weather they require an abundance of food to keep their bodies warm, and it is their habit to keep their stomachs and gullets heaping full. Often one of these birds is found to have eaten 300 to 500 weed seeds. Because of their gregarious and terrestrial habits, they are efficient consumers of the seeds of ragweed, pigeon grass, crab grass, bindweed, purslane, smartweed and pigweed. In short, these birds are little weeders whose work is seldom noted, but always felt.

HORTICULTURE.

Notes from Mr. J. P. de Waal on Tour.

Marseilles, 24th September, 1901.

I spent a week in Algeria among the extensive vineyards surrounding the city of Algiers. The visit was extremely instructive, as all the Cape conditions—soil, climate, plant-growth, &c.—are met with in Algeria.

When the phylloxera threatened to ruin the French vineyards some 20 years ago, viticulture was pushed in Algeria for all it was worth, and was attended by a period of great prosperity, as the home deficiency in France was supplied by the Algerian colonists. The Algerians at the same time rigidly enforced a law against the introduction of vine cuttings from France, and they have been quite successful so far, as no phylloxera has been detected in Algeria, although Algiers and Marseilles are only 26 hours apart by steamboat.

Thanks to the American stock, however, the output of wine in France is now as large as it has ever been before, and the Algerian wine is practically no longer required. As France was the main market for Algerian wine, the wine-growing colonists have not much of a future before them, for it must be remembered that the native Arab population are not wine drinkers.

The present output of wine in Algeria is enormous, and there are several individual farmers or commercial houses which turn out 5,000 leaguers per season more or less. Most of this wine is preserved in large cement tanks holding about 60 leaguers each.

My principal object in going to Algeria was to see how these tanks were constructed, and I was fortunate enough to hit on the right people and to get full information on that point.

Of course, when making wine in such large quantities, it is impossible to sort out bad berries and to pay much attention to general cleanliness, and the consequence is that the wine, as a rule, will not keep and has to be consumed within a year.

The average price of young wine in Algiers at present is £2 10s. per leaguer, and, owing to this low price, many growers approach hotels &c., direct, to return the profit of the middleman. I have been drinking good young wine in first-class hotels, frequented by Cook's tourists, at 15 centimes or 1½d. per bottle.

In connection with this sale of young wine a very funny thing happened. Owing to the growers pressing their four to six months' old wine on the retailer, the drinking public has acquired the fresh, biting taste of young wine, and actually does not care about wine that shows signs of age. A wine over a year old is consequently worth less in the market than a six-months'-old wine, and young wine has to be added to wines that show signs of age in order to make the latter saleable. This young wine is quite natural and light, and a bottleful does not produce a headache. I have not yet seen a single case of drunkenness in France or Algeria.

The one thing insisted upon by buyers of "vin-ordinaire" is that the wine must not have any fermentable sugar, as in that case it cannot be filtered and classified for immediate consumption. In order to ensure a successful fermentation, refrigerators are in general use, and the must is cooled down as soon as the fermenting temperature becomes excessive. These refrigerators consist of a series of long zig-zag copper pipes, through which the fermenting must is driven by a force pipe, whilst cold water runs over the pipes. This refrigeration has to be kept up night and day.

Our system of attemperators is simpler and more effective, but more costly.

Having seen everything about cement structures in Algeria, I doubt whether my journey to Australia will come off. My main object in wanting to go there was to see their cement structures, but I feel sure that the Australians cannot improve on the Algerian systems.

Good French wines are very expensive in the hotels. Bordeaux wines sell from 4 to 12 francs per bottle and Burgundies from 3 to 10 francs.

Cairo, 2nd January, 1902.

After my return from the Netherlands, I noted that the Agricultural Department was counting on the Australian part of my trip. My programme was therefore at once modified with a view to visiting Australia as well.

From Cologne, several wine-making establishments along the Rhine were visited, including the State Institution, Geisenheim, and Schloss Johannisberg, near Rudesheim.

On my arrival at Marseilles from Algiers, I went to Bordeaux, where the vintage was then in full swing. All the millions upon millions of vines on the Medoc are trellised, one, two and three wires being used, and it was interesting to note that the two-wire system—same as that adopted at Constantia—was most approved of, but much thinner wires are used than at Constantia.

Many interesting and instructive notes for my pamphlet were collected in the Bordeaux vineyards and cellars, one of the most interesting being that our old friend "White Green Grape" is identical with the "Semillon" grape, more than 50 per cent. of which enters into the composition of the world-famed Chateau Yquem wine, which has been described as a "ray of sunshine concentrated in a glass." When I was at Chateau Yquem on the 3rd of October, they were going over the vineyards for the third and last time, the ripest berries or bunches having been collected during the two preceding pickings. The leaves of the Semillon vines, general appearance, colour and brittleness of wood, size, shape, colour and flavour of the grape were all identical with the Cape Green Grape.

The Levure question has not advanced any further than the experimental stage. At Chateau Durfart (Margaux) a professor was conducting experiments at the time of my visit. His system consisted in sending a current of steam into the fermenting cuve after it was filled with crushed grapes, with a view to destroying the natural ferments, and then to add the cultivated levures. Probably his experiments without previous sterilisation of the must have been the same as ours at Constantia. All the Bordeaux men I questioned about the levure system pulled up their shoulders, and, as the managers of all the Chateaux that I visited were exceedingly frank and open, I am convinced that they have genuine doubts as to the success of the system, which does not appear to have found many followers so far.

Amongst many cases of interest there were also several to show how not to do it, such as a great want of cleanliness in some cellars and a general want of means to control the temperature of fermentation, in spite of the admission that now and again the quality of the wine suffers much from excessive heat during the fermentation.

The perfect soil and climate of the Medoc, combined with the fact that three-fourths of the vines cultivated are of the Cabernet Sauvignon variety, go a very long way to account for the excellent quality of most of the Bordeaux wines.

The grafting stock of nine-tenths of the reconstituted vineyards is the Riparia Gloire de Montpellier.

Rutherglen, Victoria, 7th March, 1902.

In South Australia I had the good fortune to meet several men of standing in the trade who showed me about their vineyards and cellars, and from whom I got a good insight into the systems of viticulture and wine making in South Australia. Notable among these was Mr. Thos. Hardy, sen., member of the firm of Thos. Hardy & Sons, with whom I had the pleasure of becoming acquainted a couple of years ago at Constantia during his trip to the Cape.

After a fortnight in South Australia, I moved on to Victoria. At Rutherglen, the largest wine-growing centre of Victoria, I was fortunate enough to find Mr. R. Dubois, Director of the Viticultural College, at home, and he kindly took me about amongst the vignerons. The vintage being now in full swing, I had good facilities for studying the ins and outs of wine-making here also, and I think I have seen enough of Australian viticulture and methods of wine-making to offer a pretty reliable opinion as to the reasons why Australia has beaten the Cape in the quality of its wines.

The main causes of the general superior quality of Australian wines are :—

1. Central wineries.
2. Systematic fermentation.
3. Grape varieties used for wine-making.

There are some 15 to 20 central wineries in South Australia which handle the great bulk of wine grapes grown in that Colony. These wineries are run by individual proprietors or companies, who are not only large growers of grapes, but buy up as much as they can handle from small growers within a radius of about six miles, and in some cases from growers ten miles distant. In order to prevent cut-throat competition, representatives of these wineries hold a conference every year before the vintage, and fix the prices to be paid to growers for different varieties of grapes. These prices vary according to the season and wine market. The following are the prices agreed upon for this year, per ton of 2,240 lbs. :—

	£	s.	d.
Cabernet Sauvignon	6	0	0
Malbec	5	10	0
Shiraz	4	10	0
Riesling	3	15	0
Mataro	3	0	0
Pedro Ximenes	3	0	0
Frontignac	3	10	0
Sweet Water (Cape White French)	2	10	0
Mixed Black...	2	0	0
Mixed White	2	0	0
Sherry	3	0	0
Tokay	3	0	0

Sellers have to deliver grapes at the wineries. On arrival, the cart or dray is pulled on the weigh bridge and the gross weight noted. After the load is emptied, the vehicle is again weighed, the difference between the weight giving the net weight of grapes paid for.

In Victoria the practice of buying grapes from small growers is also general, but the central winery does not assume the importance that it does in South Australia on account of there being more large individual growers having from 100 to 500 acres of vines.

Most of these central wineries and large growers have spacious storage cellars, keep a small staff of men specially detailed for cellar work, and blend and mature their wines. In South Australia these wineries have branches in Adelaide and elsewhere, and do their own retail trade. Several of the Victorian growers or companies also do their own retail trade in Melbourne and other populous centres.

Intimately connected with the system of central wineries or wine-making by large growers, provided with proper facilities, is a "systematic fermentation," one of the factors contributing so largely to the general success of the Australian wines. At all the places that I have visited the fermentation is conducted in open tanks made of brick and cement, with a depth of not over 5 feet and a capacity of 1,000-2,000 gallons, and in every case coolers for controlling the fermentation temperature were in use. Great expense in well-sinking has been gone to in some cases to provide the cold water required. The result is that the Australian wines are, as a rule, well fermented, and keep well through not being subjected to dangerous after fermentations as so many of our badly-fermented Cape wines are.

The grape varieties used for wine-making in Australia have also a good deal to do with the difference in quality between the general run of Australian and Cape wines. This remark must be taken to refer only to the dry red wines, as I think we have all the best varieties of white wine grapes at the Cape already.

Our chief red wine grape at the Cape is Hermitage, and so it is here, but it would surprise you to hear that our Hermitage is a totally different grape to the Red Hermitage or Shiraz of Australia. Our Hermitage is known here by the name of Ulliade or Oeillade, and is considered rather watery for a wine grape and used more as a table grape. This explains our sickening uphill work at Constantia with the Hermitage grapes rotting before maturity in that damp climate, whilst we were trying to accomplish almost impossible things under the impression that we were dealing with the real famous Hermitage grape. I can honestly say that I have not seen anywhere during the whole of my tour such enormous trouble taken in sorting out bad berries as we were forced to take with the Hermitage grape at Constantia, and I would advise that no more Hermitage vines be planted there, but Cabernet Sauvignon and Malbeck instead. Further inland, where the climate is drier—the Wellington and Worcester districts, for instance—our Hermitage will no doubt continue to be in favour for the production of light wine.

When in France I have not had the opportunity of touching at the Hermitage vineyards on the Rhone, but Mr. Dubois, of the Rutherglen Viticultural College and ex-graduate from the Montpellier Viticultural College in France, and Mr. Francois de Castella, author of the Handbook on Viticulture for Victoria, both assure me that the Australian Red Hermitage or Shiraz is the same grape as the Hermitage or Shiraz of France.

The best red wines of Australia are made of a mixture of Cabernet Sauvignon and Shiraz grapes, the Cabernet being also extensively planted. Next to these two varieties, the grape most extensively grown for red wine is the Mataro, which also makes good, full-bodied red wine, but not of as high a quality as the Cabernet or Shiraz.

I have written to my Directors to ask our Government for permission to import a quantity of vine cuttings from South Australia, and I trust that, in the interests of Cape viticulture, no objections will be made by the Agricultural Department.* South

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* The Department has already sent for a quantity of the vine cuttings thus recommended.

Australia is, as far as is known, free from phylloxera, and there are no vine diseases in that Colony that we have not got at the Cape. There is therefore no danger of introducing a new disease and no necessity for submitting such cuttings to a period of quarantine in the Eastern Province, though it may perhaps be advisable to quarantine such cuttings so as not to establish an undesirable precedent.

The soil and climate of South Australia and Victoria are not more favourable for viticulture and wine-making than the soil and climate of our Western Province; the wine cellars of Australia are no better than our Cape cellars; the system of viticulture somewhat different as regards the wider distances in planting required by the deeper and drier soils—an unimportant difference—and, in my opinion, the difference between the quality of Australian and Cape wine is to be attributed to the three causes described.

The London demand for Australian wine of the full-bodied Burgundy type is steadily increasing, and Mr. Burgoyne, the London wine magnate, is over here now to further the interests of the business. The average price realized by growers is 1s. 9d. per net gallon f.o.b. Melbourne or Adelaide. All wines are shipped in new hogsheads of 60 gallons, the average age of wines being 18 months.

Practical Orchard Work at the Cape.

(Continued from page 467.)

46. Let us take these fertilizers in their order. *Nitrogen.*—Trees take up what nitrogen they need as nitrates or as ammonia. In soils such as would be selected for orcharding, especially if prepared as directed in the preliminary trenching, fruit trees will rarely suffer from deficiency of either. They are best applied in the indirect way by means of ordinary stable manure, if only the cultivator will prepare it properly. Raw dung that has not been rotted down has no business to figure as manure, and in light sandy soils may do serious mischief. Every man who means to act fairly by his orchard will see to it that his manure-pit is covered up from rain and from sun, so that the contents are neither leached out by the one nor dried up by the other. The dung has to be kept at the degree of heat and moisture most favourable for its rapid fermentation, and be duly turned over to promote the perfect decomposition required. The dung only becomes manure and is suitable for the use of the orchard when it has fermented down into a brown mass of friable humus. Its manipulation serves two useful purposes, first, the due aëration without which the putrefactive bacteria cannot exist;

and second, the prevention of too high a temperature, which would drive off the ammonia and materially lower the manurial value of the product. On no account should fruit-trees ever get a top-dressing of fresh guano. It is popularly supposed to be a sort of cure-all or receipt for universal fertility, but its improper use has done much mischief. With fruit trees it is so easy to give an overdose, and then it materially diminishes the production of fruit, and gives instead an inordinate growth of wood and leafage. It is fair to say that the only significance of guano to the orchardist arises out of the general poverty of his manure heap, particularly in phosphates. It does not often happen that he has the means of accumulating a stock of stable dung only. Sweepings of all sorts, prunings, brushwood, leaves, kraal droppings, all go in to increase the mass. To this there is no objection, provided it can be thoroughly fermented down; but from the nature of the materials the fermentation becomes a very slow process, and by the end of the year the manure, so-called, is only about half made. To make up its deficiencies and lack of ammonia and nitrates, a sprinkling of guano, previous to turning it over, may be admissible. But the cultivator must be well aware of the risk he runs, and give with a very sparing hand.

47. A series of analyses of the guano supplied from the Government stores in the years 1891 to 1894 gives percentages of ammonia varying from 7 to 19 per cent., the average of fifteen samples being 13.53. Besides this ammonia, guano contains phosphate of lime and potash to an average amount of 16 per cent. It must be remembered that this phosphate of lime is only very slowly soluble, being in the tribasic condition.

48. It is a pity that hitherto no mineral phosphates similar to apatite have been found within the limits of the Colony. There are two sources whence phosphates can be conveniently obtained. These are, bones in the form of bone meal or reduced to powder by fermentation, and a certain by-product of the iron manufacture, known in commerce as Thomas' slag. Although bones contain precisely that substance which is required in our soils more than any other, they are as a manure extremely slow in their action, becoming available as plant-food only after being mixed with the soil for a very considerable time. Nor do all soils act on bones with equal rapidity. In well aërated open soils with a good deal of organic matter present, they decompose soonest; in clay soils they will lie for years without change. Everything depends upon the degree of fineness to which the bones are comminuted. Hence bone-flour acts most quickly, bone-meal next, while the ordinary crushed bone, consisting of large pieces, acts very slowly. This is because the phosphoric acid in the bone has combined with the lime with great force, forming what is known as insoluble or tribasic phosphate. If it were not that the water which percolates through the soil is impregnated with carbonic acid, the bone-phosphate would remain unaltered indefinitely, but the slight percentage of carbonic acid in the water carries away one molecule of lime and leaves the

phosphate in a new and more soluble form, known as dibasic or soluble phosphate. What is slowly done by the carbonic acid in open soils, may be done rapidly by mixing the bones, whether crushed or meal, with sulphuric acid. This powerful substance, when added to the extent of about one-third of the weight of the bones, takes up the lime at once and leaves the valuable phosphate in a form in which it is immediately soluble in the soil moisture, and ready for absorption by the roots. Such a mixture is known in commerce as superphosphate, and is quite easily made by the cultivator himself on the small scale, provided that he has some knowledge of the corrosive nature of the acid he is employing. The mixture dries in a very few days, and if the acid has not been used in excess, it may be safely preserved in gunny-bags until required. Owing to the solubility of its phosphatic portion, it will always be best used, at least in orchards, as a top-dressing only. It must be remembered, too, that half its bulk consists of sulphate of lime or gypsum formed in the decomposition of the bones by the acid. This of itself is a valuable manurial ingredient. It is the form in which plants most readily take up the lime and the trace of sulphur they require, and its effect upon any injurious soda carbonate, causing brackness in the soil, is immediate and effective. Thomas' slag comes into the cultivator's hands in a very fine powder, and the phosphatic lime it contains is much more readily broken up by the action of the carbonic acid in the soil than is the case with ground bones. On an average it is found to contain from 36 to 41 per cent. of phosphate of lime, and therefore it compares favourably with the medium class of superphosphates which contain from 26 to 28 per cent. and with pure dissolved bones containing 20 per cent. soluble phosphate and 10 per cent. insoluble matter.

49. Confining our attention to the use of phosphates in orchards only, it would appear that Thomas' slag has a distinct advantage over other sources. It gives out the element required, slowly, yet with sufficient readiness. It does not throw all its content of phosphoric acid into the soil the first season; hence what may be termed its staying power has a distinct and great advantage. The man who applies bone-meal, hoping to secure this same staying power for a number of years, most certainly gets it, but unfortunately the amount of phosphoric oxide liberated per season by this bone-meal is excessively small. In fact, for a phosphatic manure it does not work quick enough. The sum of the whole matter may be put thus: superphosphates work too quickly, plain ground bones work far too slowly, Thomas' slag strikes a medium between the two.

50. We have incidentally referred to lime as one of the food-materials which are only scantily provided in average Cape soils. Of course there are places where the subsoil is calcareous, but these are few and far between. In the Karroo, deposits of lime are local, and apparently scattered about capriciously over that great area. It may be as well to observe that these incidental deposits have a curious and peculiar origin. They are clearly what minera-

logists term kalk-sinter. When the Karroo in geological times was a great fresh-water lake, where the Dicynodon wallowed amid the mud and rushes, much as the hippopotamus does in Central African lakes this day, there were hundreds of places where springs rose up at the bottom underneath the sheet of water. These deep-seated springs were very largely charged with lime; in fact, they might have been called lime-water springs coming from calcareous strata lying at great depths. When their water reached the exit of the fissure at the bottom of the lake and diffused itself through the liquid mass, much of the carbonic acid gas, by the aid of which the lime had been kept in solution, was lost by diffusion. The natural result was deposition of a precipitate of lime all around the mouth of the fissure, making a sort of calcareous floor, extending perhaps for many yards in every direction, with the eye of the spring as a centre. This process of deposit would go on just so long as the fissure was open for the exit of the water. But in course of time the same causes that produced the deposit on the lake floor would cause a similar precipitation in the upper part of the fissure delivering the spring, and would ultimately choke it altogether. After that there would be an end to any further lime deposit in that place. One can easily understand this process going on at the bottom of the lake, when examining pipes which have carried a stream of calcareous water for many years and show their original calibre reduced by deposit inside to one-half or even less. After the great upheaval of the claystone porphyry just south of the Karroo lake, numerous huge cracks were made on the southern edge of the Karroo basin. The water of the lake was drained off down the lines which we now recognize as the kloofs and passes of the Zwartberg, Langeberg and its other boundaries. The farmers of the Karroo are now cultivating the flat bottom of the great Karroo lake, and here and there they come upon these restricted deposits of calcareous sinter, very convenient for either building or manurial purposes. It is a pity that similar stones of lime do not exist all over the Colony.

51. We have spoken of lime as a plant-food. No very large quantity is required, but there must be some. Given this small quantity, the remaining function of lime in the soil is something quite different. It sets up a chemical action, setting free in a soluble and available condition materials which existed in the soil, for instance, potash and phosphoric acid, but in an insoluble form, incapable of absorption by plants. There is plenty of potash in soils derived from a granitic base, but it is locked up in combination with silica. A generous application of lime combines with the silica and sets free the potash. The case is much the same with insoluble phosphates. Then it has a remarkable effect in assisting the nitrification of all organic manures added in the usual way. Also upon soils of a more or less compact clay its mechanical effect is very remarkable. It has a peculiar power of altering that mechanical condition of clay which makes it what is termed *colloidal*, that is, plastic and impervious to water. This condition is,

for cultivation, about the most unpromising that there can be. It is scarcely possible to do anything with such earth by ordinary means. The only method is thoroughly to incorporate with it heavy dressings of lime and establish reliable drainage along the natural water-table. The result is that the clay becomes, as it is termed, "flocculated," or collected into little clots, around and between which moisture and air can intervene. Thus, and thus only, can plastic clay be converted into cultivable soil.

52. Turning back to the analysis of fruit-ash, it will be seen that the proportion of lime is considerable, amounting, in the apple, to 63 per cent., in the orange to 22 per cent., and in the plum to 10 per cent. Now all of this large amount has to be given to the trees. It is therefore a safe thing to be fairly liberal with lime top-dressings to most orchards which have not a calcareous subsoil. That is to say, the only soils where lime freely used will not be materially beneficial are those whose texture is already very porous and open, and which already have the percentage of lime demanded as plant-food. In these its mechanical effect is not called for.

53. One is often asked what can be done to correct the objectionable brackness or alkalinity of some of our soils, so that some kind of an orchard crop can be obtained from them. Once for all let it be stated that ordinary lime has no curative effect; what is wanted is gypsum, that is, sulphate of lime. The brackness known locally as zwart-brak is due to carbonate of soda, a substance actually poisonous to plants. The sulphate of lime exchanges constituents with it, and you get sulphate of soda and carbonate of lime as the result. Now although sulphate of soda is not a desirable thing for one's soil, yet it is not nearly so mischievous as the carbonate would be. Hence it is quite possible for a cultivator whose circumstances oblige him to work on an area which is more or less zwart-brak to make a very tolerable culture off it by dint of a generous application of gypsum. Before many years are past, the few places where gypsum deposits are known to exist will have a future before them.

GREEN-MANURING AND SNATCH-CROPS IN THE ORCHARD.

54. There is yet another method of adding to the manurial constituents of the soil which should not pass without notice. This is the raising of a quickly growing annual crop between the rows of trees and turning it in with the plough or cultivator to decompose under the surface soil. Nitrogen and organic matter form the principal gains derivable from this so-called green-manuring upon the large scale on corn lands; they scarcely apply to the smaller scale of orcharding. Thus, short of complete rotation of crops, there is no better way of checking wire-worm in corn-lands than by raising a snatch of rape or colza as early in the season as possible, and turning it under just before it flowers. The insects that harbour in an orchard, however, are very different from the wheat-growers' wire-worm, and its nitrogen is much better added by means of stable manure or chemicals. Besides, one of the greatest improvements of

modern times in relation to orcharding is the custom of keeping the whole of the orchard area free from any growth whatever—from weeds of course, and from snatch-crops also. It has to be a well kept, pulverized, bare surface acting as a mulch and air-absorber for the underlying root-stratum. Will it ever be so at the Cape? Perhaps not, just yet. Old habits will be too much for us, and we shall for some years yet go on growing our small stuff in among the trees in the orchard. Be it so, since we as yet know no better. But the great thing to be remembered in all these snatch cultures (allowed to exist because of the hardness of our hearts, and perhaps we may say—of our heads) is, that nothing whatever can be permitted except such things as salads, onions, pumpkins, melons, all annual crops, which deal only with the very superficial layer of soil at the surface. It would be truly suicidal policy for a man to lay down a crop of lucerne, for instance, among his trees. Its roots would soon get down a full yard deep and try conclusions with the apple and peach roots to their very great disadvantage. Yet such things are done in this year of grace, 1896. Besides, there is a fatal temptation in the matter of green-manuring. It is so easy to deceive yourself into fancying that you are letting the weeds run riot all over your orchard of set purpose and as an act of wisdom, because you mean some day, not fixed, to turn them in as green manure. Depend upon it, the man who lets weeds grow to avoid the labour of keeping his land clean all through, will find plenty of excuses for avoiding the labour of turning them in. And then what are we to call his orchard? A plot with a great many trees and a few weeds, or a mass of weeds with a few trees among them? If there were no other argument against green-manuring than this, there would be enough to leave it prudentially out of the canon of fruit-growing.

THE APRICOT.

It will be understood from the general preliminaries respecting the forming of trees from the year old graftling, that the balance of experience at the Cape is in favour of low dwarf trees, because of their occupying less space, coming into bearing sooner, and being far less exposed to injury from high winds and the accidents of harvesting. The tendency to push the standard pattern with tall axial growth has been a fashion of late, just as a few years ago, men coming out here with a European experience only condemned our Cape habit of pruning vines in the *gobelet* dwarf style, and would fain have us set up poles and trellises. We venture to say that the dwarf orchard tree will remain in vogue after most of the experimental standards have been cut back and regrafted.

The apricot pushes so vigorously and fast that special foresight is required to prevent it from growing beyond its strength and courting its own destruction by too liberal spreading of branches. It is advisable to take *all* trees as graftlings of a year old from the nursery, if you understand their management; but this precaution is specially necessary with the apricot. Let the shoots you encourage for main branches be alternately set, step-wise, on the 12-15 inch main axis left after planting, and as far as possible balancing each other all round the tree. It is bad policy to have three or four branches springing from what is practically the apex of the stem, like a Y with many arms. One may easily secure this alternating outspring by rubbing out a bud here and there and letting the intermediate ones develop themselves. Precisely the same precaution has to be taken in the development of shoots arising after the second and third prunings. The result is that a well-managed apricot tree shows very few clear Y joints anywhere. The arms of the Y come out askew to each other, one of the pair starting always a little lower down on the branch it springs from than does its mate of the same season.

We said the apricot is over lavish in its growth and fruit. Therefore, bearing in mind that abundant foliage means abundant elaborated sap, permit a fair show of short laterals to push out from the main branches, and do not look upon them as gourmands consuming the strength of the tree. Crush the soft end with the thumb and finger when they have advanced 4 or 5 inches, and let them make what foliage they will. It is advisable to keep the fruit-buds as near the main stem as possible; you may always be certain of the quality of the fruit produced there. The second year's formative pruning is generally best made to an inside bud all round. This has the effect of throwing the growth of the tree inward, and as a natural consequence the whole weight of the head, and also the considerable additional burden of fruit in its season, is held much more perpendicularly over the main trunk than would be the case had the outside bud been encouraged and the arms allowed a wider angle of expansion. It is surprising how greatly the leverage of the dead weight upon the forks of the limb may be relieved by this forecast. Branches with which no care has been taken are liable to split away from their holding at the fork, owing to the comparative brittleness of the quick-growing apricot wood, and an unsightly scar and ill-balanced tree results. Nor is the matter much mended if the owner, detecting the dangerous leverage that threatens to terminate in the splitting of a principal fork, helps the tree with an iron hoop bracing the limbs of the fork together. Such makeshifts may save the branch in a high wind, but they are confessions of bad management and of not knowing one's business properly. The fruit is borne on the wood of the previous year, and as the habit of the apricot is to rush out into needlessly long shoots, these must be shortened back sharply every winter and more sparingly in summer. All ill-placed interfering branches and weak watershoots have to be sacrificed.

The vigour of the tree is such that the head will each year fetch up a somewhat rounded outline instead of a flat top, particularly if the practice of cutting to an outside bud is followed.

The choice of stocks for the apricot lies between self-seedlings and peach seedlings. Experience has shown that the great yellow St. Helena peach makes an excellent stock provided the soil is open, well worked and well drained. It will not, however, stand the abuse of unnecessary irrigation. That piece of mismanagement is quick and sudden death to the peach as soon as the outlets for free seepage get clogged. If the soil is not favourable to the peach, self-seedlings may be used, or in still harder conditions, plum stocks have the best chance. Of these the recently introduced myrobolan plum is highly commended. Its use, however, is too recent here to allow of actual experience being quoted. In places where the soil is naturally very dry or the subsoil rocky and innutritive, the almond may be used. Opinions differ much as to its value, some declining to use it on the ground that the graft does not make a sound junction with the almond stock, and is liable to be blown out by the high winds or to snap off. Others recommend it from trial, claim for it a special fitness, and maintain that it makes a satisfactory adhesion. It is probable that both views are right in their own way, that is to say that the looser textured wood of the apricot as grown in rich fertile soil does not fit the harder tissues of the almond, but that when its rampant tendency to rapid growth is checked either by more sterile soil or drier atmospheric conditions, its wood-layers approximate more to the texture of those of the almond, and a better junction results. To this view tends the tradition of French nurserymen, that the almond is a preferable stock in arid chalky uplands. They use by preference the hard-shelled sweet variety. In the eastern United States, with a colder climate than ours, the plum stock seems to have the preference.

(To be continued.)

VETERINARY.

Second Report from Veterinary Surgeon Spreull on the Result of his Experiments with the Malarial Catarrhal Fever of Sheep.

Since October last most of my inoculations have been combinations of serum and virulent blood, and so successful have they been that only four sheep, viz., Nos. 121, 139, 148, 150, have died out of eighty which have passed through my hands. Of these four, only one received serum and that in an obviously inadequate quantity.

PRESERVED VIRULENT BLOOD.

This, except in the case of No. 182, has always been injected under the skin. When citrated blood is kept mixed with the preservative in the manner described in our last report it gradually becomes flocculent and a large proportion of the red blood corpuscles settle down in the bottom of the bottle—the medium becoming therefore rather unsuitable for intravenous work. This is no advantage, however, as, like the fresh virulent blood, it exerts its action equally well when injected subcutaneously. Defibrinated blood preserves much better than citrated blood, remaining of a more equal consistence. In this condition the blood can be kept for a very long period, and, though it gradually attenuates, the date of inertness seems to be a remote one, as I have found it potent up to 127, 158, 174 days in three different samples.

MALARIAL FEVER IN GOATS.

I can make no valuable addition to what was said on this subject in my last report. Since October a yearling Kapater and a kid, three and a half months old, have been inoculated intravenously with a large dose of virulent blood. The kid alone seemed to react, and that mildly, on the 10th to 13th days. Blood taken from these on the 6th and 5th days respectively proved virulent for sheep Nos. 134, 161. Blood taken from the Kapater on the 14th day produced a good reaction in No. 141, which thereafter withstood the usual test. Nos. 121, 122, 179 received blood from goats twenty-three days after their injection, but were not at all protected and when tested turned sick, No. 121 dying. In No. 128 the cause of resistance to test is more or less doubtful. There appears therefore to be no definite date at which the goat's blood would serve as an attenuated vaccine.

ANTITOXIC SERUM.

In my last report I was able to give the results of one or two inoculations with serum and to make a forecast of a promising nature which I feel sure you will be pleased to hear has been amply fulfilled. Several sheep which had salted some time previously were fortified from time to time with doses of 40 c.c. fresh virulent blood subcutaneously and blood was tapped from them ten days or so later from which serum was made. In Nos. 136, 137 the fresh blood itself was used intravenously, and, though taken from Nos. 1, 4 on the tenth day after fortification, it not only did not produce disease but it very completely protected them against virulent tests on the 10th and 12th days respectively.

Serum followed by virulent blood.—The case of Nos. 114, 119 has been already described. The large dose of serum (10 c.c.) protected the former from a virulent test on the 12th day, no reaction being manifested; the latter showed only slight reaction when tested on the 20th. In Nos. 149, 150 the dose (1 c.c.) of serum was altogether too small: the former, tested 5 days after receiving the serum, became very sick and recovered; the latter, tested on the 13th day, developed severe symptoms and died ten days later.

Virulent blood followed by serum.—In these experiments a standard dose of 2 c.c. v.b. subcut. was used to infect; doses of from 1 c.c. to 4 c.c. serum were used as protectives 24 or 48 hours later. In all cases a more or less pronounced reaction took place, No. 162 alone showing sick (mildly), and this sheep received the smallest dose (1 c.c.) of serum, three have withstood tests, the others went to Glen Avon and are yet untested, but I would not fear to do so.

Simultaneous virulent blood and serum (two injections).—In this camp about thirty sheep have been inoculated by this method, the injections being made one on each side under the thin bare skin behind the elbow. In most cases the serum was from one animal only, yet it seemed always quite reliable whether used fresh or carbolised. As a rule a standard dose of 2 c.c. v.b. was used, and it was found that the serum diminished its attack in direct proportion to the amount given. Few had more than a mild reaction when 3 c.c. serum was used; with 2 c.c. slight symptoms were sometimes developed, whilst 1 c.c. was still more dangerous in a larger proportion of cases. In these serum-inoculated sheep it was very interesting to note how abortive forms of the disease manifested thomselves. From those which showed all the symptoms in a mild form to those in which no reaction whatever was noticeable there were several grades in intensity. Some showed only a blueness or redness of the oral mucous membrane without desquamation, and these generally became markedly footsore; others again showed the latter symptom alone, sometimes lasting a week, sometimes only for two or three days; such sheep, although they did not cease to feed, would be noticed thin and empty after their day's grazing. In No. 165 not even a thermometric reaction was noted, yet I had no difficulty in finding the plasmodium in his blood when I examined it microscopically on the 12th day. In Nos. 127, 142, 143 no distinct reaction was produced, yet they proved quite resistant when tested on the 28th, 58th, 69th days respectively, *i.e.*, at periods when the protection of the serum (supposing it to have annihilated the virulent blood soon after injection) must have entirely worn off. No. 147 received 10 c.c. v.b. intrav. and 3 c.c. serum subcut., yet had only a slight reaction. Nos. 187, 188 received unfortified serum from an animal salted about eight weeks previously; doses of 3 c.c., 2 c.c. were used but the protection might have been more complete. Several of these sheep have been tested and resisted satisfactorily, but the majority have now been sent to Glen Avon to undergo veld infection. The data given above as regards the amounts of virulent blood and serum necessary were arrived at from experiments on a small scale in camp and confirmed by our larger experience when inoculating Mrs. Brown's sheep at Glen Avon.

Preserved virulent blood and serum (two injections).—These experiments have been performed in exactly the same way as the last and are equally satisfactory; with long preserved bloods a smaller dose of serum would seem to be effectual. The glycerine in the preserved blood makes the sheep jump about in a peculiar manner for a few moments after injection; this is especially noticeable when a large dose is given very cold.

Serum and fresh virulent blood (*mixed—one injection*).—Nos. 189, 190 each received a freshly made mixture and both reacted well, becoming tender on their feet. Nos. 194, 193 received the mixture after it had stood twenty-four hours; neither have had a distinct reaction and the latter is now undergoing a test. In Nos. 191, 192 preserved blood was mixed with the serum and immediately injected; neither reacted, and the latter is now under test. Nos. 197, 198 received blood with which an equal quantity of ½ per cent. or ¼ per cent. aqueous solution of carbolic acid had been mixed eighteen hours before, and both have turned sick (moderately); it would seem therefore that the parasite is not readily destroyed or impaired in its action and so we have all the conditions for its inoculation of the easiest. Fortified serum can be readily sent out as was done in the case of rinderpest, and a dose of 3 c.c. will figure out pretty well in an eight-ounce bottle; preserved virulent blood can also be supplied easily, and if the two are mixed immediately before using one injection only will be required. This inoculation will therefore be a fairly rapid one, nor apparently need we fear the destruction of the virulent blood by the ½ per cent. of carbolic acid contained in the serum. Further experiments might show that a stronger carbolic solution alone could be relied upon to attenuate fresh virulent blood, and to this end I have now inoculated No. 199 with equal quantities of virulent blood and a 1 per cent. solution of carbolic acid.

VELD INFECTION EXPERIMENT.

Forty-nine merino lambs, all of which I consider as already salted by different modifications of the serum process, were sent to Glen Avon on the 15th inst. They were placed amongst the flock which had recently suffered from Malarial Catarrhal Fever and are grazing with them at night. Of the 49, 15 have resisted a test injection but the remaining 34 are quite untested. Of these 16 have never shown symptoms, 11 were footsore only and 7 had a mild form of the disease. On the 20th inst. I found all well except No. 187, which seemed to be suffering only from debility.

GLEN AVON EXPERIMENTS.

On January 10th I visited Glen Avon and found three sheep suffering from Malarial Catarrhal Fever. These sheep were the first to show sick in a flock of 295. In this flock nearly all were ewes, the majority being full-mouthed, some with four teeth and a number with only two permanent incisors cut. They were all new to the veld there, and, although in very fair condition, the disease spread and affected old and young alike. I obtained a quantity of virulent blood from the sickest of these three sheep. As I did not feel confident enough of my inoculation method only 42 were inoculated on the 10th, all with double injections.

Two sheep, Nos. 183, 184, were inoculated in camp at Somerset East with this virulent blood alone and acted as controls to above experiments.

Jan. 18th.—Visited and took a number of sheep's temperatures ranging between 102° and 103°.8 at 7.30 a.m; two uninoculated sheep taken by way of comparison registered 100°.3 and 101° F. The temperatures taken were mostly those of sheep which received preserved blood and serum. Seven fresh cases have broken out in the rest of the flock.

Jan. 22nd.—Took temperatures of 16 out of the 42 inoculated sheep. P.v.b. sheep 105°.6, 103°, and several 101° to 101°.8 at 7.30 a.m. Fresh v.b. sheep—2 had very slight sore mouth, whiteness behind incisors and bluish oral mucous membranes, 2 more had last symptom only; temperatures ranged between 104°.6 and 101°, but generally from 101° to 102°. Only one sheep (p.v.b.) has been taken out of flock as visibly sick and it recovered; 10 fresh cases have occurred in the uninoculated troop.

Jan. 30th.—Took temperatures of sheep inoculated on 22nd.

Feb. 1st.—Visited and inoculated about 160 sheep (2 injections).

After detailing a number of similar experiments, which confirmed the results already given, Mr. Spreull concludes by stating:—

Feb. 11th.—No fresh cases since dipping on 1st inst. until to-day, when 2 were found fevered, with sore mouths and swollen lips. These 2 bring total of sick up to about 30 head, four of which died, all save one amongst uninoculated troop. Outbreak now ceased, but cases kept breaking out later in another flock grazing on lucerne adjoining the pasturage where these fed.

COUNTRY REPORTS.

Bizana.

MAJOR H. SPRIGG, R.M., 6th March, 1902.—There has been a fair amount of rain during February but plenty of sunshine too, the last ten days being very hot. The harvest will not be a heavy one, but the general impression is that it will be very fair. Stock are doing well. Cattle when offered for sale, which seldom happens, fetch extraordinary prices, often five or six times what they would have fetched five years ago.

Butterworth.

J. M. YOUNG, A.R.M., 3rd March, 1902.—The month of February was, I think, the hottest we have had this summer, so much so that in some portions of the district the late crops have been completely withered up. During the past week several storms have passed through the district, and should these continue, a fair crop of mealies and Kaffir corn may still be reaped. Pasturage is fair, and stock of all kinds are in good condition and free from disease.

Elliot.

J. P. Cumming, R.M., 28th Feb., 1902.—Very little rain has fallen. Two more cases of lung-sickness have occurred. The mortality amongst the Military horses has decreased.

Elliotdale.

B. Whitfield, A.R.M., 5th March, 1902.—A great deal of rain has fallen during February, coming just at the right time as the crops were being dried up by the hot weather experienced during January. The crops of mealies and Kaffir corn are looking healthier and there is every prospect of a fair harvest being reaped. Millions of voetganger locusts have been hatched along the coast and have done considerable damage to the mealies. They have been treated successfully with locust fungus, but the natives will only infect the swarms in their own gardens, and as fast as they die others come in from the grass and forests. I have sent out one of my constables to treat the swarms outside the gardens. Stock of all descriptions are in good condition and health, and pasturage is good.

Flagstaff.

J. F. C. Rein, R.M., 1st March, 1902.—The weather during the past month having been favourable the crops have made good progress. All pasturage has kept in first rate order and stock of all kinds are in splendid condition. No diseases have been reported.

Fort Beaufort.

B. Booth, 4th April, 1902.—There was a rainfall last month of 3·88 inches, and this month, up to this morning, 1·36. The country is looking at its best. There will be abundance of grass for winter grazing. I do not think the mealie and Kaffir corn crops have benefited to any great extent. Stock are in good condition; no disease has been reported amongst large stock. Sheep are still dying in the Konap ward of heartwater.

Kokstad.

W. M. Carlisle, Acting R.M., 13th March, 1902.—During the past month there has been no rain. Crops are stunted and suffering from the drought; should it continue for a fortnight all the mealie will be killed. Cattle and sheep are in good condition; age is pretty fair but is also suffering from the drought. It is fortunate that the locusts have not yet appeared.

Libode.

J. C. Garner, R.M., 1st March, 1902.—A fair quantity of rain at frequent intervals visited this district during the past month, thereby proving of great benefit to the growing crops and hastening their maturity. Locusts have not as yet made their appearance in the district, and I anticipate an early harvest with an abundant yield, especially as regards Kaffir corn. The tobacco crop should also be a good one and far better than it has been for some years past. Stock of all kinds are in the best condition, and there is no disease amongst them. The veld is still good and very plenteous.

Lusikisiki.

R. W. Stanford, R.M., 28th Feb., 1902.—Very little rain has fallen and the weather has been sultry. Stock are, generally speaking, in good condition and free from disease. The standing crops of mealies and Kaffir corn give promise of a fair yield, except in low situated lands, where too much water has done serious damage.

Matatiele.

R. F. Comming, Acting R.M., 5th March, 1902.—Since my last report the drought has in a measure broken up, and several heavy storms have occurred in parts of the district, in some instances causing considerable damage to crops. I am of opinion that the yield of crops is more promising. Pasturage is much improved since the rain, and stock continue to do well. No cases of lung-sickness have been reported during the month. Biliary fever amongst horses has been more prevalent of late.

Maclear.

J. Simpson, Act. R.M., 4th March, 1902.—I have very little to add to my January report. The month set in with dry weather which continued well into the month, but since then copious showers have fallen. Horses in some parts of the district are suffering from colds, similar to influenza; otherwise stock, so far as I have been able to gather, are doing well.

Mount Ayliff.

E. Barrett, Act. R.M., 28th Feb., 1902.—Several terrific storms have taken place during the month, considerable damage being done by hail and floods. Pasturage continues good as also do the prospects of growing crops. Both lung-sickness and redwater exist in quarantined areas but do not appear to be spreading.

Mount Currie.

A. Rein, A.R.M., 28th Feb., 1902.—During the month now closing the rainfall has been heavier than in any of the preceding months this summer. Several hailstorms passed over the district, causing considerable damage to crops and fruit. Lung-sickness is dying out in the township and district, and I hope soon to be able to report that the district is once more free of the disease. Pasturage is good.

Mount Frere.

H. B. GARNER, Acting R.M., 12th March, 1902.—There is nothing special to report for last month. Seasonable rains fell and the growing crops are looking well. Stock are in good condition, and, with the exception of cattle, are healthy. Lung-sickness still exists in the district, fresh outbreaks being reported almost daily, and it appears that it will be some time before this disease is thoroughly stamped out.

Ngqeleni.

W. F. C. TROLLIP, Asst. R.M., 13th Feb., 1902.—During the month of February there was very little rain and consequently the late crops are suffering. A few small swarms of young locusts made their appearance in the locations along the coast. No outbreaks of disease amongst stock were reported.

Nqamakwe.

R. MACLEOD, A.R.M., 28th Feb., 1902.—The rainfall for the past month was 4.59 inches. No steady rains have fallen, but several severe hailstorms passed over the district during the latter part of the month. The green fruit and young crops suffered from the hail. The crops in some parts of the district are looking well, but in others they are very small on account of the drought and not likely to reach perfection. Cattle and sheep are in fine condition and the veld is still very good. Three cases of redwater have been reported during the month.

Port St. John's.

W. J. ST. J. TURNER, R.M., 1st March, 1902.—The mealie and Kaffir corn crops are beginning to ripen, and taken all round look fairly well. In some parts, however, the mealie has been a good deal damaged by the grub. Sweet potatoes are cultivated extensively by the coast natives and promise an excellent yield. Tobacco should also be good and plentiful. Stock of all kinds continue to do well.

Qumbu.

H. H. BUNN, Act. R.M., 28th Feb., 1902.—There is nothing to add to the report of last month. The weather continues to be dry and a good rain is very much needed. Pasturage is plentiful and stock in good condition.

Tabankulu.

R. H. WILSON, A.R.M., 28th Feb., 1902.—The past month has been an exceedingly good one. Good rains (7.76 inches) fell at nice intervals throughout the month, and have revived a number of crops lying in the deep valleys, which had almost perished. A swarm of locusts (voetgangers) appeared; the natives were induced to turn out and destroy them. Lung-sickness is still spreading in the neighbourhood of first outbreak. Every precaution is being taken to stop it.

Tsomo.

H. D. Levy, A.R.M., 28th Feb., 1902.—The rainfall registered during the month was 1.64 inches. Four cases of redwater were reported during the month, and in each case the kraals were placed in quarantine, and the usual precautions taken. Drought still continues, and I fear if we do not get rain this month, nothing of a harvest will be reaped. In many parts of the district the crops have been scorched up, but in some they look promising. Locusts have not, as yet, made their appearance in the district. Stock, both large and small, continue to remain in fair condition.

Umtata.

A. H. Stanford, R.M., 5th March, 1902.—The month of February was exceptionally dry and hot, with the result that the mealie crop has suffered so severely that a very poor harvest only can be expected; in most parts of the district the result can only be a complete failure. Stock continue in fair condition, and the several outbreaks of lung-sickness are being got under.

Umzimkulu.

Capt. J. E. Whindus, R.M., 28th Feb., 1902.—The temperature has been higher this month than during the previous summer period; a fair quantity of rain fell (3 inches), which has served to keep the pasturage good and fresh. No outbreak of disease amongst stock has occurred. The cereal crops still look very promising, and a good yield is now, I think, assured. The yield from fruit trees has also been good this season, especially in peaches, but unfortunately the cost of transport to a market renders such a means of disposal of the surplus impossible.

Willowvale.

M. W. Liefeldt, R.M., 28th Feb., 1902.—I have nothing to add to my report of last month.

Xalanga.

E. H. Hogge, R.M., 4th March, 1902.—February if anything was drier than January. The early mealie crops are now quite destroyed; the late crops may produce a little. Kaffir corn, which stands drought better than mealies, is looking fair; grass is very poor and stock are falling off in condition. Unless we get rain before the frost, there will be a heavy loss of stock this winter.

The Feather Market.

Messrs. Wm. Spilhaus & Co. report under Thursday's date, April 17th, as follows:—

Ostrich Feathers.—Final news of the London sales reached us on Monday morning. Superior Whites and Feminas are reported at 10 per cent. lower, and all other descriptions suffered a more severe decline in values.

The steamer which left here on the 8th inst. was the last in time for the June auctions. Buyers are now operating for the July sales.

Our local market took place this afternoon, when only a small quantity was submitted. Of the offerings a greater part consisted of very indifferent quality. Feathers suitable for the local trade showed no change in values, whereas other wings were from 5 per cent. to 10 per cent. lower. Boos, Blacks and Drabs suffered a decline of from 15 per cent. to 20 per cent.

Mohair.

Messrs. Van der Byl & Co., Cape Town, supply the following quotations under Wednesday's date, April 23rd:—

Summer Hair	10d. to 11d. per lb.
Winter Hair	7½d. to 9½d. "
Kid Hair	1/- to 1/6 "

GOVERNMENT NOTICES.

Seed Oats.

In connection with the Notice appearing in the *Agricultural Journal* of the 14th March, 1901, and subsequent issues, it is notified for the information of farmers and others interested, that a small quantity of "*Texas Rust-resistant*" and "*Algerian*" Oats raised from seed imported by the Government, is now available for distribution for experimental sowing, at 19s. per bag of 150 lbs.

Applicants must pay carriage from Cape Town Station.

As the quantity of seed at disposal is very limited, not more than 2 bags can be allowed to any one person.

Applications, accompanied by a remittance to cover cost of the seed, should be sent in, at once, addressed to the Under Secretary for Agriculture, Cape Town; and will be dealt with in the order in which they are received.

Cape Government Railways.

ADMISSION OF APPRENTICES INTO THE LOCOMOTIVE DEPARTMENT.

There are vacancies for Apprentices in the following Branches of the Locomotive Workshops at Salt River, viz.:—

Boiler Shop	Three boys for heating rivets and cleaning Boilers, to learn the trade of a Boilermaker.
Carriage Shop	Two boys, to learn the trade of a Sawyer.
Carriage Shop	One boy, to learn the trade of a Carriage Fitter.
Carriage Shop	Two boys, to learn the trade of a Coach Builder.
Carriage Shop	Two boys, to learn the trade of a Coach Painter.
Blacksmith Shop	One boy, to work steam hammer;

and applications from youths between the ages of 14 and 16 are invited for filling the vacancies.

Applicants must have passed the 5th Standard, and will be required to produce a certificate to that effect, and also certificates as to character.

Applicants who are able to produce proofs of having satisfactorily passed a higher standard of education will receive the preference in filling the vacancies, other things being equal.

The rate of pay to commence with will be 2d. per hour.

Applications should be sent to the Chief Locomotive Superintendent or Locomotive Superintendent, Salt River, from whom any further particulars can be obtained.

Office of the General Manager of Railways, Cape Town,
8th March, 1902.

T. R. PRICE,
General Manager.

Farmers' Apprentices. Dairy Assistants, &c.

As inquiries are from time to time received from young men from abroad as to where they may serve apprenticeship or gain practical experience of farming in this Colony, before starting on their own account, the Secretary for Agriculture invites Farmers who are willing to receive young men of good character, for this purpose, to register their names with the Under Secretary for Agriculture, stating the class of farming they do, how many young men they are prepared to take, and for what period they would enter into an agreement.

It is not probable that these young men will be in a position to give more than their free services in return for the experience they will gain; that is, they will not be able to pay any fee; and they will look to receiving free board and lodging in return for their services.

It is to Farmers, therefore, who are willing to grant such young men free board and lodging in return for services rendered, that this application is especially addressed.

With reference to the above notice to Farmers, the Secretary for Agriculture now invites young men who are willing to engage themselves as Farmers' Apprentices in Cape Colony to register their names with the Under Secretary for Agriculture, Cape Town. The apprentice will gain experience in farming in South Africa, and have an opportunity for spying out the land before starting on his own farm. To the new comer from another country this is essential, for he has much to learn and unlearn.

Many applications for such Apprentices have been received from Farmers in the Colony. It will be noted that the Apprentice will neither receive wages, nor pay a fee. He will get free board and lodging in return for his services, and at the same time acquire the experience he is in need of.

Applications for employment have also been received from several Lady Dairy Experts and Dairy Assistants; and Dairy Farmers and others desiring to avail themselves of the services of such are invited to register their names with this Department, giving particulars as to situation and extent of operations, etc., and salary and other emoluments they are prepared to offer.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM BASUTOLAND.

By command of His Excellency the Governor, the following Proclamation No. 164, 1901, was published in the Government Gazette of October 29th, 1901:—

Whereas by Proclamation No. 100, bearing date the 4th day of June, 1901, I did by reason of the existence of the disease amongst cattle known as Rinderpest in the Territory of Basutoland, prohibit the introduction of horned cattle from the said Territory into this Colony:

And whereas the said disease has spread to the portions of this Colony which adjoin the said Territory, thus rendering it unnecessary to longer maintain the prohibition imposed by the said Proclamation:

Now, therefore, under and by virtue of the powers and authorities in me vested, I do hereby proclaim, declare and make known that from and after the date hereof the prohibition upon the introduction of horned cattle from Basutoland into this Colony shall be removed: the said Proclamation No. 100 of 1901 being hereby repealed accordingly.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM ORANGE RIVER COLONY AND THE TRANSVAAL.

By command of His Excellency the Governor, the following Proclamation No. 139 1901, was published in the Government Gazette of August 16th, 1901:—

Under and by virtue of the powers vested in me by the "Animal Diseases Act," No. 27 of 1893, and by the "Animals Diseases Rinderpest Amendment Act," No. 2 of 1897, I do hereby proclaim, declare and make known that it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced into any part of this Colony from the Orange River Colony and the Transvaal, save and except such cattle as may be required to be introduced by the Government for the purpose of supplying Bile or Serum for inoculation against Rinderpest:

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed

And I do hereby further declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

Proclamation No. 217, bearing date the 29th day of October, 1900, together with the regulations issued thereunder, is thereby repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined Regulation for checking the spread of the infection is republished.

REGULATION ISSUED UNDER PROCLAMATION No. 30, DATED 20TH JANUARY, 1899.

Whenever under the provisions of Sections 11 and 12 of Act No. 27 of 1893, any area is declared or proclaimed to be an area infected with Rinderpest, it shall not be lawful for any person, animal, animal produce, article or thing, who or which may, in the opinion of the Magistrate of the District in which such area is situated, be liable to convey infection of Rinderpest, to leave or to be removed therefrom.

Inoculation Against Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of the Colony, it is desirable to inform stock-owners of the intentions of the Government as to dealing with the outbreak should it unfortunately become general in the Colony, and to advise stock-owners as to the best course to follow.

The Government propose that, as a general rule, cattle-owners themselves should perform the inoculation. Glycerinated Bile will be used, though circumstances may arise where it will be preferable to use Serum.

Bile Stations will be established in suitable places as necessity arises in localities where farmers have agreed to contribute the required proportion, say 5 per cent., of their cattle for production of the bile. It must be clearly understood that unless farmers are prepared to thus contribute the necessary cattle, it will be impossible for them to have the benefit of a Bile Station.

Glycerinated Bile will be issued free to contributors in proportion to the number of cattle contributed to a Bile Station. To non-contributors a fair charge will be made for bile if any be available for issue.

Serum will be charged for at the rate of £1 per bottle of ten doses.

A limited supply of Glycerinated Bile to meet emergencies will, for a time, be available, free of charge, from the Bile Station which has been established under arrangements with the Imperial Military authorities near Aliwal North.

As occasion requires, Demonstrators will be sent to instruct farmers in the method of inoculation, free of charge. They will, as a rule, inoculate only enough cattle to show how it is to be done, leaving the owner to continue the work. The Government will supply syringes on application to the Resident Magistrate, or to the Demonstrators at the following charges:—20 cc. capacity, 20s; 10 cc. capacity, 15s. This payment may be recovered on return of the syringe to the Magistrate, in good order.

After the experience gained during the outbreak of 1896-1898, the Colonial Veterinary Surgeon wrote* as follows:—

"The method of inoculation which I would recommend in future sporadic outbreaks of the disease is briefly as follows:—

"*Infected Herds.*—These should be inoculated at once with either serum or glycerinated bile; every animal which indicates infection by a rise of temperature should receive a large dose of not less than 100 cc. of serum, or 80 cc. of glycerinated bile; the latter should, by preference, be injected into the jugular vein, so as to secure its immediate action. Then from eight to twelve days after, all the animals in the herd which give no indication of being infected with the disease, or fever temperature, should receive an injection of pure bile; not less than 10 cc., and for large animals 20 cc. This will confer a lasting immunity sufficient for all practical purposes.

"*Clean Herds.*—When it is decided to inoculate a clean herd, which is in danger of becoming infected through its proximity to diseased cattle I would recommend that the animals composing the herd should be inoculated first with 20 cc. of glycerinated bile, and to follow this inoculation in from eight to twelve days with an injection of

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* See *Agricultural Journal*, June 6, 1899, in which will be found a full consideration of the different methods of inoculation.

" from 10 to 20 cc. of pure bile. This will confer a strong and lasting immunity on the " animals in the herd, and will be free from risk arising from the inoculation or of " introducing the disease.

" *Use of Pure Bile.*—Pure fresh bile should not be used in an infected herd, if any " of the other inoculating materials can be obtained, as it tends to intensify the " character of the disease in those already infected, and its immunising effect is too " slowly developed to protect the healthy cattle against infection, if they are left in " contact with those already sick. If no other means are available, however, the " temperatures of the whole of the cattle in the infected herd should be carefully taken " by the clinical thermometer, and only those which register a normal temperature " should be inoculated with pure bile, the others should be separated from the inoculated " lot at once, and carefully tended. If glycerine can be obtained, the spare bile should " be mixed with it in the proper proportions—one part of glycerine to two parts of " bile. This mixture, after standing forty-eight hours, may be injected into the affected " animals in large doses, not only with safety, but with marked benefit.

"*Preparing the Bile.*—The bile should be taken from an affected animal immedi- " ately after death, or from one which is killed in the last stage of collapse.

" Biles of all shades of colour—except those which are red from the presence of " blood - may be used, so long as they are clear and free from a putrid smell. Thin " light yellow biles should also be rejected.

" All the galls extracted at one time should be mixed together, after standing sepa- " rately for twelve to eighteen hours, so as to render them uniform in strength and " immunising properties. Pure bile should be used on the second day after being " drawn, unless it is kept in an ice chest, when it may be kept sweet much longer. But " if pure bile is used as a second inoculation only, as above directed, it is not desirable " to keep it longer than twenty-four hours.

" Glycerinated bile is made by adding one part of glycerine to two parts of bile, stir " the mixture well, then mix all the biles taken at one time, and allow them to stand " for eight days. But if there is urgency, the glycerinated bile may be used forty-eight " hours after it is mixed.

" I would strongly recommend that in every outbreak of the disease that occurs, " every drop of suitable bile, obtained from the animals which die, should be mixed " with glycerine in proper proportions, two parts of the bile to one of glycerine, so that " it may be preserved and made available for the inoculation of infected herds, and also " for the first inoculation of clean herds which may be considered in danger. Pure " bile for the second inoculation of clean herds can always be obtained when the " disease appears in any locality, which would be the only reason for inoculating clean " herds in the immediate vicinity."

Taking the Bile.—To remove the bile the animal must be laid on its left side, the skin and flesh on the right side immediately behind the last rib being cut through; the ribs being raised, the gall bladder will become visible. The gall bladder should be then punctured with a small knife and the gall allowed to escape into a wide-mouthed bottle. If wide-mouthed bottles are not available then ordinary whisky bottles may be used with an *enamelled* funnel, which can be procured at any country store. Every precaution must be taken that the operation is performed in a thoroughly clean manner, the hands of the operator and all knives, &c., being thoroughly cleansed before use.

Inoculating.—After having secured the animal to be operated upon, the necessary dose of bile is injected under the skin of the dewlap by means of a Hypodermic Syringe, care being taken that the point of the needle is not inserted into the flesh, but between the skin and flesh.

Symptoms of Rinderpest.

The Outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined description of the symptoms of Rinderpest is hereby published:—

The early symptoms of Rinderpest are a rise of internal temperature to 106 or 107° Fahr.; the animal stands with its head hanging down, ears drawn back and coat staring; it refuses all food and occasionally shivers. A mucous discharge flows from the eyes and nostrils; the extremities are cold, and the breathing is laboured and frequently accompanied with moaning. The inner part of the upper lip and roof of the mouth and all visible mucous membranes are reddened, and covered with an eruption of minute pimples, and later with a branlike exudation. The bowels are

occasionally constipated, but in most cases diarrhœa sets in, the evacuations being slimy and very frequently of a dirty yellow colour. The prostration of strength is great, the animal staggering when made to move. In milch cows the secretion of milk is rapidly diminished, and soon ceases altogether. The disease usually ends fatally in from six to ten days.

It is generally believed that the infection is produced through the respiratory organs; from there the contagion becomes generalised. The contagion exists in the secretions and excretions, urine, saliva, mucous secretions of the nose, mouth and eyes, in the sweat, expired air, blood, and in all the tissues. It may be conveyed directly by the diseased animals, or indirectly by the dung, the bedding, the earth, hides, wool, meat, clothing, wagons or vessels, by people, dogs, sheep and chickens, &c. Contagion takes place only through short distances. When the weather is dry this is reduced to its minimum (about 27 yards), and the progress of the disease may be stopped by a ditch separating the diseased from the healthy animals.

In order to detect the earliest symptoms of Rinderpest, owners of horned cattle are warned of the urgent necessity for keeping a constant and close watch upon their stock. Any suspicious cases should be immediately reported to the nearest Resident Magistrate, Field-cornet or Police Officer, and the sick animal kept separate till an inspection is made. Stock should be carefully examined daily by a responsible person, more particularly for any symptoms resembling those above described.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1128 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October, 1900:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(a) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(b) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz :—

Number and general description of Cattle } ....
....
....
Owner's name and address } ....
....
In charge of..............................
Place to which Cattle are being sent..............................
(Signature)..............................
(Address)..............................
Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature..............................
(Address)..............................
Date....................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a

period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle ....
Owner's name and address ....
In charge of..
Place to which Cattle are being sent..............................
(Inspector's signature)..
(Address)..
Date....................

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	8	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	8	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, 19th April, 1902, as telegraphed by the Civil Commissioners of the places respectively named, and from Natal, is published hereunder.

CENTRE.	A. Wheat per 100 lb.	B. Wheat Flour per 100 lb.	C. Boer Meal per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal per 100 lb.	F. Barley per 100 lb.	G. Oats per 100 lb.	H. Oat-hay per 100 lb.	J. Potatoes per bag.	K. Tobacco (Boer Roll.) per lb.	L. Beef per lb.	M. Mutton per lb.	N. Fresh Butter per lb.	O. Eggs per doz.	P. Cattle Slaughter	Q. Sheep (Slaughter)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s d	£ s. d.
Aliwal North	...	...	...	...	...	...	...	.	...	..	...	...	...	...	...	...
Beaufort West	0 13 0	0 17 6	0 12 6	0 15 0	0 12 0	0 15 0	0 7 6	...	0 15 0	0 1 0	0 0 8	0 0 7	0 2 0	0 2 6	£15 to £18	20/- to 22/6
Burghersdorp	0 9 0	...	0 12 6	0 11 0	..	0 8 0	...	...	0 7 0	...	0 0 7	0 0 7½	0 1 0	0 3 1	...	...
Cape Town	0 10 0	0 12 6	0 11 0	0 9 0	0 11 0	0 9 6	0 11 0	0 10 0	1 1 0	0 0 6	0 0 7½	0 0 8½	0 2 0	0 2 9	17 0 0	1 4 0
Clanwilliam	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Colesberg	0 9 0	...	...	...	...	0 8 0	...	...	0 10 0	...	...	...	0 1 6	0 2 6	...	...
Cradock	...	..	...	...	..	...	...	...	0 12 0	0 1 3	0 0 8	0 0 8	0 1 2	0 2 6	...	...
Dordrecht	0 8 6	0 17 0	0 14 0	0 11 0	0 12 6	0 8 0	0 6 0	...	0 12 0	0 1 6	...	...	0 1 6	0 1 9	...	...
East London	0 11 6	0 17 3	0 11 6	0 13 9	0 10 0	0 15 9	0 18 3	0 12 6	0 17 3	0 1 6	0 1 0	0 1 0	0 2 6	0 3 6	..	...
Graaff-Reinet	0 11 6	...	0 13 9	0 11 3	...	0 11 0	0 11 0	..	0 15 0	0 0 6	0 0 7	0 0 7	0 1 6	0 2 0	£10 to £13	20/- to 24/-
Graham's Town	...	...	..	0 13 3	...	0 9 9		0 7 0	0 9 9	0 1 3	0 0 8¼	0 0 9½	0 1 9½	0 3 6½	...	...
Kimberley	0 13 0	0 17 0	0 14 0	0 13 0	0 12 0	0 12 6	0 12 0	0 14 0	1 5 0	0 1 0	0 1 0	0 0 9	0 2 0	0 3 6	£12 to £18	20/- to 24/-
King Wm's Town	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...
Malmesbury	0 10 0	0 15 0	0 13 0	0 13 0	...	0 8 0	0 10 0	0 7 6	0 15 0	0 1 6	0 0 8	0 0 7	0 1 9	0 2 3	14 10 0	1 4 6

CURRENT RATES OF AGRICULTURAL PRODUCE—*(continued)*.

CENTRE.	A. Wheat per 100 lb.	B. Wheat Flour per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal. per 100 lb.	F. Barley per 100 lb.	G. Oats per 100 lb.	H. Oat-hay per 100 lb.	J Potatoes per bag.	K. Tobacco (Boer Roll.) per lb.	L. Beef per lb.	M. Mutton per lb.	N. Fresh Butter per lb.	O Eggs per doz.	P Cattle, Slaughter.	Q. Sheep, Slaughter
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Mossel Bay ...	0 12 0	0 16 6	0 12 0	0 9 0	...	0 6 0	0 16 0	0 7 6	1 0 0	0 1 9	0 0 9	0 0 9	0 1 6	0 1 6	...	...
Pietermaritzburg Natal	..	...	...	0 6 0	0 6 9	...	..	0 8 0	0 10 0	0 1 0	0 0 11	0 0 10	0 2 3	0 4 0	25 0 0	1 5 0
Port Alfred	...	...	...	0 16 6	...	...	...	...	0 12 6	0 2 6	...	...	0 1 6	...	...	..
Port Elizabeth ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	..
Queen's Town ...	0 11 6	0 16 6	0 11 0	0 10 6	0 5 6	0 13 3	0 11 6	0 9 0	0 8 3	0 2 6	0 0 8	0 0 7	0 2 0	0 2 3	...	...
Tarkastad ...	..	...	...	...	..	...	...	...	.	...	.	...	...	..	...	...
Vryburg ...	0 16 0	1 1 0	0 17 6	0 12 6	0 5 0	...	0 18 0	1 1 0	1 6 0	0 1 6	0 0 11	0 0 10	0 3 6	0 1 0	.	...
Worcester ..	0 11 0	0 15 6	0 12 0	0 10 0	0 11 0	0 9 0	0 12 6	0 7 0	0 15 0	0 1 0	0 0 8	0 0 8	0 1 9	0 2 0	12 0 0	1 4 0

Note.—Returns have not been received from Civil Commissioners of Aliwal North, Clanwilliam, King William's Town, Port Elizabeth and Tarkastad.

THE

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EDITORIAL NOTES.

The Agricultural Department has ready for distribution among the farmers of the Colony a number of sacks of the seed of the Zout Bosch. As is well known, this fodder plant is identical with the famous salt bush of the Australian veld. It is invaluable for cattle, sheep, and other herbivora who are extremely fond of it, and it grows plentifully when planted in arid upland districts and elsewhere, especially where the soil is brackish. Its drought-enduring qualities are remarkable; hot south-easters have little check on its growth. The seed germinates readily under ordinary conditions, and the plant grows well from cuttings put down in the common way. It will thus be readily gathered that little outlay is requisite. In the present instance, the Department has made arrangements to supply the seeds to farmers at a price that will barely cover the cost.

We don't think there are many farmers in Cape Colony who are ignorant of the great value of the Zout Bosch, therefore a full description of its virtues is unnecessary. The number of seeds to a lb., dry, is about 25,800 gross and 20,000 net.

They may be sown at any time during the spring, summer and autumn months. When the object in view is to make use of old and worthless lands, they should be ploughed but not harrowed, and the seed should be sown in small patches about fifty yds. apart, from half an inch to an inch deep, and well protected against sheep and cattle till the stem of the plant is too hard for them to eat. Inverting thorny bush over the spot after sowing is trouble that would be well repaid. A light mulching of straw prevents too rapid evaporation, and in clay soils, the pinching of the tender stem of the seedling.

A few years ago the Zout Bosch was first introduced into the Colony, and has grown and spread a good deal in many places, but it is well worth twenty times the amount of attention that has been paid to it.

Full particulars will be supplied in an official notice on the subject in our next issue.

At page 578 we publish an extract from M. Armand Gautier's paper on the discovery by him, recently announced in the *Comptes rendus* of the French Academy, of a specific for malarial cachexia. The contributor of the translation is of opinion that the similarity of the causes of malarial fever in man and redwater in cattle makes it possible that the discovery of a specific cure for malarial fever announced by M. Gautier, may prove applicable to the treatment of redwater, although it is admitted that quinine does not seem to retain on redwater the specific action it has on malaria. M. Gautier claims that disodic methylarsenate or "arrhenal" injected into the blood in minute quantities is an absolute cure for malarial fever. Nine cases, refractory to ordinary treatment, were rapidly and completely cured by one or two, or, exceptionally, three or four doses of the drug. It has been suggested to us that the treatment might be found efficacious in the analogous disease of dogs known as malignant jaundice or distemper, but inasmuch as our Government Entomologist has recently demonstrated that malignant jaundice in the dog is caused by a species of tick, we have our doubts about the efficacy of "arrhenal" in this direction. We have submitted the paper to Dr. Hutcheon, Chief Veterinary Surgeon, and while he would be glad to welcome anything that tends to ease the burdens of veterinary practice he reserves his opinion about "arrhenal" till he has had time to learn more about it generally.

Mr. W. Gibbons Cox, C.E., contributes to the current number of the *Empire Review* an article on the Artesian Waters of Australia with some suggestions for irrigation. The surprising thing is that Queensland with such vast supplies of artesian water has not millions of square miles of green fields and pastures new to make up for the terrible drought that has been causing havoc in the State. We have ourselves been over much of the land embraced in the reach of the bore water, and have wondered why the copious streams were not used more freely for irrigation. We believe we were right in attributing this very much to the apathy of the stock-owner, whose sole concern was the watering of his stock.

A few weeks ago the question arose in the columns of the *Journal* whether artesian water was suitable for plant life, and we remember to have seen in a recent number of *Nature* a tiny paragraph to the effect that a certain gentleman had stated and another had acquiesced that it was doubtful whether artesian water could be used for irrigation because it was believed to contain deleterious salts. We must confess that, inasmuch as we look for great results from proper artesian boring in South Africa, we were startled at the appearance of this bogey, and while we gave publicity to an opinion that appeared in a respectable journal like *Nature* we questioned whether such an irresponsible surmise, even though it might be based upon a particle of fact, could be applicable to all artesian waters. So far as practical experience goes there seems to have been little, if any, true artesian water brought to the surface in Cape Colony. Mr. Cox in his article says that the aggregate number of feet bored in Australia is 1,066,605, equal to 202.01 miles, and the average depth per bore is 1,197 feet, ranging from 100 feet, an exceptionally shallow depth for an artesian flow, to 5,045 feet. Fifty-nine bores are over 3,000 feet deep, the deepest being 5,045 feet. There are sixty flows exceeding 1,500,000 gallons per day, the largest being 6,000,000 gallons. What we mean to say is this, that the water borers in this Colony have not yet reached the permanent subterranean water, the origin of which is as old as the earth's crust itself, and which, except in the low-lying parts of table lands in Australia, are scarcely ever met with except at enormous depths. We have seen a good deal of healthy vegetation irrigated by artesian water in other lands, and we are glad to notice that Mr. Cox says irrigation by bore water is gradually coming into more general use, and grass lands, mostly on agricultural holdings, have been irrigated to the extent of 8,000 acres by this means, and sugar and other tropical products to the extent of 1,839 acres.

At a meeting of the Royal College of Veterinary Surgeons it was agreed, on the motion of Principal Owen Williams, Edinburgh, seconded by the ex-president, Mr. Jas. Fraser, to elect Dr. Duncan

Hutcheon, M.R.C.V.S., Chief Veterinary Advisor to the Cape Government, an honorary associate of the College, this being the highest honour which can be conferred on a member of the College. We congratulate Dr. Hutcheon on the receipt of an honour in which the Colony shares.

QUERIES AND REPLIES.

Artificial Manures for Potatoes, Wheat and Mealies.

Will you give me particulars of the best artificial manures for potatoes, wheat and mealies, and the proportions of each, and tell me how long the soil will retain the benefit.

The nature of the soil is rather sandy, dusty and loose, somewhat poor in its natural state and situated on the slopes of the Drakensberg High Veld.

A. P. FITZHENRY.

In the limits of a letter it is impossible to give correspondent more than indications as to the methods of manuring the three different crops respecting which he inquires. Besides, we are not in possession of any analysis of his soil which would enable us to judge of its deficiencies. For potatoes the special demand is that there should be a sufficient percentage of potash; for wheat and mealies, lime phosphate; for the latter a slight top-dressing of good guano is advisable, and even for the wheat if there has been no rotation of intermediate crops for some years and leguminous snatch crop ploughed in green. But it is only by actual experience that each farmer can find out how to handle his land to the best advantage; therefore there should always be a few rods of land laid off, and to each separate strip thereof a different manure should be applied, say as thus: (1) Thomas' phosphate, (2) Kainit, (3) Guano, (4) Stable manure, (5) Kraal dung. The trial crops sowed cross-way of this lot of sections will give the best possible tip to an intelligent, observant cultivator. One strip should be left alone for comparison.

On the whole, without analysis of correspondent's soil to guide, I think the safest recommendation for the soil, which he says is rather poor, would be to rely on stable manure for the potatoes, using any wood ashes or even ashes of kraal dung for a top-dressing when the setts begin to point. For his wheat and mealie land he may give three to five cwt. of Thomas' phosphate per acre to begin with when the land gets its autumn dressing, followed with a light top-dressing of good guano (say 200 cwt. per acre) to supply nitrogen. Correspondent should note that mineral manures like the phosphatic slag are all very well, but, somehow, they do not tell on the crops as one expects unless they have some nitrogenous matter. Mealies can do with heavier manure than other cereals.

E. P.

Sheep Maggots.

I have just noticed a different kind of maggot on my stud sheep. The ordinary maggot is smooth and the same thickness throughout, this one might be described as a hairy one and thicker at the one end than the other and seems to be more voracious. I should like some information on the subject.

These maggots were found where they generally attack long woolled sheep, round the tail, where the wool gets wetted by the urine.

R. PELL EDMONDS.

The flies which generally lay their eggs in the wounds of animals and in decomposing animal matter, belong to the genus Lucilia, but there are several species. The most common are the L. Sericata, L. Macellaria, and L. Cæsar. If you could forward some specimens of the larvæ, and if possible, of the fly also, we would try to identify them by comparison.

D. H.

Oranges Pierced by "Fruit Moth."

Per parcel post I am sending four oranges. These seem to have been stung by a fly. I have only noticed it within the last week, but have been unable to find the fly. The oranges are quite green, and after being stung wither, turn yellow, and fall off. Should I find the fly will send same to your office. Your report, with advice, will oblige.

M. J. B. LANGFIELD.

The oranges appear to have been pierced by a "Fruit Moth" of which there are a number of species in the east of the Colony. You should go into the orchard at night with a lantern if you wish to see the insect at work. You will find it to be a moth measuring nearly three inches across outstretched wings. No remedy is known, though some choice fruit is saved by netting the trees.

C. P. LOUNSBURY.

Vine Disease and Spraying.

I have young grape vines growing on a wall, or rather trained on wires fastened to a wall; there are several varieties, one of each. A common blue grape and a hanepoot were in tins for about 3 years, consequently when I put them in the ground they grew fast and covered space rapidly; the other vines were got from a nurseryman and as yet have only the upright stem.

The hanepoot and the blue have got anthracnose, and it is spreading to the other vines Our entomologist, Mr. Claude Fuller, named the disease and kindly told me what to do for it.

The mixture, sulphate of iron and sulphuric acid, requires great care in handling, and to treat the blue vine I should have to work on a 12-foot ladder. Being an old man I rather funk the work, consequently I want to know whether it will destroy the vines if I cut them down to within a foot or so of the ground and then dress the stem with the mixture? I, of course, understand that it would throw the vines back, but that would be preferable to spilling the mixture on myself.

The wall, against which all but the blue vine grows, is at present 6ft. high, eventually I hope to make it 8ft. high; it faces the rising sun.

Supposing I could afford it, would the vines be benefited if a covering, say 3ft. wide, made either of galvanized iron or roofing felt, were put over the vines to protect them from heavy rains and hailstorms? The vines are: Black Hamburgh, Black Portugal, Buckland Sweetwater, Gros Colmar, Moore's Diamond, Delaware, Concord, Isabella or Catawba.

James Thorrold.

P.S.—If you say "Cut the vines," when will be the best time to do it?

Correspondent does not say what is the strength of his acid of sulphate of iron mixture, nor does he describe the way in which he has been applying it.

On the whole, practice has not borne out the anticipations which were made with regard to the value of this treatment. And the difficulty of swabbing the vine-stock and branches with the corrosive acid solution is considerable, as correspondent seems to find; however, the process is simplified by pruning back the vine at the proper season, then the mixture consists of 100 parts by weight of water, preferably hot, one part by weight of sulphuric acid, added very slowly in the thinnest possible stream and well stirred up. No metal vessel can be used unless it is enamelled. A light wooden tub is the best. To this mixture is added as much sulphate of iron as the water will dissolve, and if the copperas, as it is called, has first of all been dried to a powder in an oven, it will dissolve the more readily. Then the operator defends himself from chance mischief by covering his person with a muid-sack, in the bottom of which a hole has been cut to slip his head through and a slit on each side for his arms. A whitewash-brush, or, better still, a large paint-brush, serves to swab every portion of the vine. The bark turns black or nearly so, but the life of the vine is not injured.

On the whole I should recommend correspondent to spray in the ordinary manner, and rather frequently, with the ordinary Bordeaux mixture—that is, copper sulphate and lime, which is equally effective, and is applied with a spray pump without the necessity of any particular precautions on the part of the operator.

Of course correspondent understands that the growing of vines in Natal, a land of summer rains and frequent hailstorms, is necessarily risky, and the grower has to be content with what the climatic conditions leave him. He speaks of covering his vines; the only thing that appears to me possible would be the rigging up of light wooden frames, latticed with reeds and supported aslant from the coping of the wall against which the vines are stretched. These are not favourable to the ripening of the grapes, but would be a distinct safeguard against hail. The Cape West with its absence of rain from November to April—that is, during the whole fruiting, colouring and ripening of the grape—is the proper climate for the vine. The Eastern Province and Natal with converse conditions can never give it either fair chance or grow it with any real hope of commercial success. A Natal vine, like an English vine, should be under glass.

The vine should only be pruned during its period of rest, when the leaves are off, and without being shown how to do it by a practical man, it is hardly possible to prune properly.

E.P.

Bamboo Culture.

What is the correct time at which bamboos should be cut down to the best advantage? I have some standing, varying from one to three years old.

Is there any particular month in the season for doing so, as we find those grown in the Western Province do not split as much as those grown in these parts.

Will be most pleased to receive any information on the above.

W.H.C.

Coverside Post, Cathcart.

As this is an arborescent grass the same thing is true of it as of other plants of the same nature, but this fact does not remove it from the conditions of growth and season in a small way which belong to trees properly so-called. Therefore it will be only common sense to let the year's growth run to a full end and the sap descend to its natural reservoir, viz., the succulent roots, before proceeding to cut the sticks for sale. Wherever grown, inland or seaward, the cultivators will have to follow the turn of the seasons peculiar to their own locality. E.P.

The Spekboom for Australia.

I have before me papers showing the desire of Australians to get help by the introduction of some of our best stock-feeding, drought-resisting native plants; and surely, for helping in a drought-tried land, they could hardly apply to a better country than South Africa; one that, for countless ages, has had the grand work of evolution trying all forms severely; so that the fact of survival points at once to the adapted value of our native Karroo flora. Mr. J. H. Maiden, Government Botanist at Sydney, advocates the introduction of spekboom. Curiously enough, the information sent him by our Conservator of Forests has these words:—"Spekboom is the universal name in South Africa, not the Boer name, as you put it." Then it is said by Mr. Maiden: "The natural home of the spekboom is in the Karroo," and he is told by Mr. Hutchins in return: "I do not think it grows in the Karroo." That spekboom is native to the Karroo is well known to all who know anything about it. The earlier occupiers of the Karroo were Dutch, and the fact that they gave the name to the bush when they first met with it in the Karroo, is of itself good proof that the spekboom is native to the Karroo; and Colonists after them have very naturally called the plant by the name given to it by the Dutch pioneers.

Spekboom is widely distributed over the Karroo; not so much on the flats as on the rands or hills—rugged, stony crests showing up everywhere about the so-called Karroo plains—crests that often carry special plants, because the intruded dykes below cause them to give soil different to much of the flats around them.

Spekboom is, therefore, very widely distributed, and is very much valued, not alone as a stock food, but because it makes more useful to the animal the drier and more woody veld plants they feed on with it. So valued is it, that you rarely see it left out of the list of good things that are advertised to recommend a farm when it is for sale. Coastwards too, in some localities, as Mr. Hutchins says, it is abundant. In the bush which the railway traverses about Addo, and the northern slopes of the Zuurberg, it is, when in blossom, a pretty and common feature. It is said to be different to our Karroo form, and not cared for by stock so much. It is not a different variety, but the preference of stock for a certain food depends much upon locality and surroundings. Our dry Karroo makes a feed of succulent bush, such as spekboom, very appetising when found. On the slopes of the mountains around Graaff-Reinet it is abundant.

Our climate suits it well, being over 2,500 feet above sea level, and frosts are rare.

I should be sorry for our Karroo farmers if spekboom were not a native plant, and a very good native too, of the Karroo veld.

Our Australian friends think they will be helped by the introduction of this valuable stock-food. I feel sure our farmers will gladly respond to help them. There are difficulties; the seed is peculiar, and very short-lived in transport. Mr. C. E. Lee, of Klipplaat, has taken great interest in spekboom propagation. Cuttings, he says, should not be less than two inches in diameter, and are better for keeping 30 days before planting in a dark, cool, dry place. Such cuttings should stand export well. The spekboom, like most other succulents, does not part with its moisture easily, and does not dry out quickly; so that, when a fair-sized branch falls on the ground, if the ground is at all favourable, it will take root like a prickly pear. These facts point to cuttings as the best means of helping the plant to Australia.

I should like these notes on the introduction of spekboom to Australia to have a practical outcome, and should be glad to communicate with any Australians in the country who have friends at home interested in farming pursuits, and to receive any suggestions as to how to get the cuttings to Australia. Packed loosely in wood shavings in an ordinary case they would travel well, although the leaves would drop off. But experience has shown that a dexterous gardener can strike little plants from the leaves in sand, and so largely increase the number of plants sent over as cuttings. The coast spekboom is considered to be more brack in flavour, and is not so much relished by stock. But probably the difference of soil and climate has much to do with this, as Mr. Lee informs me that the brack cuttings, when cultivated in the Karroo, are eaten by stock as readily as is the other. If this is correct, then cuttings from the coast plants might be safely taken.

I trust that the authorities will help when the transports carry men to Australia, and so speed the plough, or rather, spread the spekboom.

WM. ROE, Sen.

Graaff-Reinet.

We shall be glad to be the medium of correspondence as suggested by Mr. Roe.—EDITOR.

Dodder in Lucerne.

The following is the gist of a reply sent to an enquirer about this parasite:—

As to dodder in lucerne, I regret to say that there is no method of extirpation other than those which have been advised, viz., the use of sulphate of iron and the heroic system of burning. When the cultivation of lucerne was first seriously taken up on a large scale, experts emphatically protested against the folly of saving sixpence or so per pound in buying low-classed unsifted English and American seed instead of procuring the very best of the best, twice sifted Provence seed from a house having a world-wide reputation to maintain, such, for instance, as that of Vilmorin-Andrieux in Paris. It was, of course, pointed out that other seed would be dear at a gift and would inevitably introduce dodder. But then nobody knew what dodder was, had never seen it nor heard of it, so they saved their little sixpence and chanced it. Now they know better, and are at last possessed of that bitter wisdom which is distilled out of the experience of the unwise.

If the correspondent, a practical and highly intelligent man, will consider that there is *burning* and burning ; the one half-hearted, imperfect and unwilling, the other observant, thorough, and determined ; I do not think it need be set aside as no cure. It is not good burning that will leave dodder-seed "lying on the ground ready for germination," or permit the parasited stubs of the lucerne within the circle of the smouldering heap to escape calcination. Dodder burning is not a ceremony done for the sake of appearances, like smelling your top-hat when you go into church. It is a real tussle with a real enemy, and must be done in earnest.

The great thing is to begin clean, with clean seed, and that is just what few will do. I hope the growers will have the wit to combine and *refuse to purchase any local seed* which is not guaranteed free from dodder, through a double set of siftings through sieves which will only just retain the lucerne and will let the dodder through. The sellers would be compelled to set up an installation of sieves, and use it to produce a clean article as demanded. Then no dodder and no wizened imperfect, undersized seed. *Caveat emptor* is a proverb as old as the hills, and the meaning is: Let the buyer take care he isn't humbugged and stuck with doddery lucerne.

P.M.O.

HORTICULTURE.

Practical Orchard Work at the Cape.

(*Continued from page* 530.)

THE PEACH.

To those who have a fair professional acquaintance with fruit-tree growing, built up from an apprenticeship, journeyman days as an improver, and the reflective observant leisure of foreman and head-gardener, the case of the peach at the Cape is one for commiseration. The tree is so liberal of its growth, so generous with its fruit, so patient of ill-usage up to a certain point, that it has become the *souffre douleur* of the careless, and the favourite of those who think that potatoes and onions require care and attention, but trees can look after themselves. Of late, many orchards of ten or fifteen years standing, with trees set in holes amid untrenched ground, have come to the end of their possibilities. The increasing compactness of the soil, drenched and dried alternately, and the clogging of what natural drainage existed along the water-table slope, has slowly killed out the roots, and the topmost branches, with the imperfectly ripened late wood of the year, die back to the usual stag-horn pattern. Then follow attempts to revive the tree, hot manure to the collar, and excessive flooding by irrigation. The whole root-system becomes involved in the mischief, and we have a case of what we may term "Cape Peach Yellows.' It is such a pity that the art and mystery of tree-growing is treated so differently from other arts and mysteries. No man pretends that with a piece of leather, an awl, and a few wax-ends, he can make a shoe, on the strength of having seen and worn shoes all his life. A man who pretends to cure diseases without having passed through the severe study and practice of the medical schools is—we all know—a quack, that is, a mixture of rogue and fool in varying proportions. Yet every third man you meet in the country will undertake to plant an orchard and grow peaches without having learned the first principles of the gardener's art. It is but to dig holes and put trees in—what more would you have! The trees do the best they can for him as long as possible. At length they succumb. Even their exceptional vigour and hardiness gives in at last. If we are going to do things right and act fairly by our trees we must study their special wants and provide for them. The peach demands one thing above all, that is, a thorough and free drainage. The actual content of the soil itself is of much less import than the great requirement of unchecked respiration of the roots, and that can only be got by ensuring the rapid escape downward and away of all the natural rain, and still more of the artificial irrigation water, sucking in the vital air it holds in solution. No planned drainage—then no veteran peach trees; nothing but short-lived invalids cut off before their prime. The soil must be a sandy loam, with a tendency to dry out rather than to retain moisture. Sodden clay is not worth the labour required to bring it by liming and vegetable manure to anything like the proper soil for the peach. Just as your soil gets further away from the definition of being clayey, and fulfils the conditions of an open mellow loam, the clods of which break in your hand to fragments like meal, so will it benefit the noble peach.

However, something may be done to humour the peach in the matter of soil. If one *must* work in heavy clayey land, because of lack of other choice, then after effort at improvement by liming to flocculate the clay, and addition of strawy manure to open it into air pores, the plum stock may be grown for grafting on. There is one disadvantage, however; most plum stocks sucker very much under the peach and give a vast amount of trouble. Of late years the myrobolan or cherry plum has been used and answers well, being free from this objectionable habit. But wherever the main conditions we have insisted on are reasonably fulfilled, the peach or self-stock is to be preferred. There can be none better than the great yellow St. Helena peach for most localities. But in this widely varied land, where our working altitudes range from sea level to 5,000 feet, the grower must not go by book only. He must look around and observe for himself which seedling peaches in his neighbourhood are hardiest and finest, and choose these for his stocks. When the ground is stony, shaly and dry, the sweet almond may be used. But in that case a little skill is requisite, something beyond the rough cleft made in the stump and the scion wedged into the split. It is astonishing that such rude work ever succeeds. We believe that—given a suitable dryish soil and careful whip or tongue grafting—it is very little we should ever hear of the standing complaint against these stocks, that is, of young trees blowing loose from their almond mother-stock.

Twenty feet is outside measure for the peach distance. Some modern growers give more, but this is rather in obedience to a general consensus of opinion that the old crowding system must be discouraged and discontinued. Thanks to the enterprise of a few of our nurserymen, very excellent yearlings may be had, either self-stocks or myrobolan. Do not fancy you are getting more for your money by buying two-year-olds. The peach is in such a hurry to get along and make growth, that you are likely to have a very perplexing lot of laterals already started on the two-year saplings. Beginners find it difficult to harden their hearts sufficiently to cut all these close and leave a scarred, uneven-looking foot of stem. Some nurserymen pinch out the apical bud at a bare eighteen-inch height and encourage three or four laterals which will make a ramping growth of five feet or more in the first season. These are cut back to nine inches in winter, and are delivered to purchasers, who thus get a yearling plant with a two-year-old head on it. We cannot do better than quote the directions of a practical fruit grower who has in our very midst shown the way to success. He says:—

"After shortening the side branches of the tree in its first year's growth to the length required, by cutting back to a bud, inner or outer, right or left, according to the shape required, a long growth of young wood will be thrown out. An amount of a quarter to three-quarters of this can be then cut away, according to the taste of the grower and the distriubtion of the fruit buds. After this pruning in a peach tree, one can expect a small crop, and during the cutting one should keep an eye on the double or treble buds, that is, the fruit buds, in view of inducing a crop. As the tree gets older the same course of cutting back and thinning out should be pursued, with intent to produce a quantity of new or bearing wood successionally each year, thus enabling the pruner to distribute his coming crop over the whole tree. Nor should he forget the leaving of such well-matured wood which may be forced out from the main stem as shall tend to balance the general set of the tree and equalise its bearing. The branches left in this way should, of course, be cut back in due course, leaving only a few more fruit-buds that are wanted for the following year. In fact, on the peach no laterals should be left of their full length, and the pruner must always look to the fruit-buds, and never forget he is cutting the bearing wood. You will occasionally see your fruit-buds near the points of the branches. Under these circumstances you must leave them, and do more thinning out of branches. Some farmers have asked me if I approve of summer pruning the peach tree while in its fruiting stage. I say most emphatically no, because by doing this you cause a double growth of new wood, entailing twice the amount of cutting."

It is necessary to call attention to the difference between the leaf-bud and the flower-bud, in the peach and other stone fruits, as a guide to keeping the balance of wood and fruit. The bearing shoots in the peach and nectarine always show towards their base a number of acute solitary buds with a brown scale-cover. These are leaf-buds. Higher up will be seen a smaller number of buds standing three together, a thin one in the middle, with a plump silvery-coated one on each side. These latter are flower or fruit-buds. Your object is to encourage them rather than the other, many of which may be rubbed out, but as the trees bear on the last year's wood, provision must be made for fruit-bearing shoots for the next year, to come on in succession. Those buds, then, which are best placed, are to be left for this purpose while you are disbudding the remainder.

Major Downing, the veteran American pomologist, gives directions for peach-pruning in a similar strain. He says:—

"If the trees are left to themselves, the growth is mostly produced at the end of the principal branches, and the young shoots formed in the interior of the head die out. The consequence is that the head is filled with long lean branches provided with young shoots only at their extremity. Anyone can see that such a tree can only possess half the number of healthy bearing shoots that it would have had if filled throughout with vigorous young wood. The sap flows tardily through the long rigid branches, and there are not half enough leaves to secure the proper feeding of the fruit. Such fruit as there is comes at the ends of the branches, which often break under the awkwardly placed weight. Instead of this we substitute the *shortening in* method of pruning. As early as may be the work begins, *i.e.*, cutting back half the last year's growth over the whole of the tree. As the average is from one to two feet we shall take off from 6 to 12 inches. It need not be done with precise measurement; indeed the strongest shoots should be shortened back most in order to bring up the others, and any long projecting limbs that destroy the balance of the head are cut back to uniform length. This brings the tree into a well rounded shape. By reducing the young wood to one-half, we apparently reduce the coming crop one-half, so far as number of fruits is concerned. But the remaining half, receiving all the sustenance the tree has to give, comes to double the size. The young spurs which start abundantly from every part of the tree keep it well supplied with bearing wood for next year, and the greater size and luxuriance of the foliage, as a necessary consequence, produce larger and more highly flavoured fruit. Remember, in shortening back, to cut to a *wood-bud* for the finish of each shoot. Else you may have fruit coming out at the very tip, unsheltered by leaves and certain to drop early or come to nothing."*

It is scarcely possible to avoid saying something upon the subject of what is known in the United States as Peach Yellows, and about which there was recently a scare in the Colony, contemporaneous with the spread of American Pomological literature among us. Seeing that one of the acutest practical investigators, Erwin F. Smith, utterly failed to discover any bacillus or other fungoid parasite, and relinquished further enquiry as fruitless, it is probable that the cause has been sought for in the wrong direction, and that yellows is not a morbid condition produced by parasitic interference, but something far simpler, viz., constitutional exhaustion brought about by a long course of bad cultivation, as regards soil, abuse of irrigation, neglect of skilled pruning and continuous over-cropping. To avoid repeating here the conclusions come to and published in the *Agricultural Journal* after a close examination of numerous supposed cases of yellows in the Colony, we will subjoin, on this matter, the views of the eminent pomologist from whom we have already quoted :—"We believe the malady to be a constitutional taint produced by bad cultivation and exhaustion, and perpetuated by sowing the seeds of the enfeebled trees, either to obtain new varieties or for stocks. Let us look for a moment to the history of peach culture. For a hundred years after its introduction it was largely cultivated in perfect freedom from disease and with the least possible care. The natural fertility of the soil was then unexhausted, and the land occupied by orchards was seldom or never cropped. Most of it, though at first naturally fertile, was light and sandy, and inevitably in course of time became exhausted. The peach, always productive to excess in this climate, was no longer able in the impoverished soil to recruit its energies by annual growth, and gradually became more and more enfeebled and short-lived. Wheat and grain crops bore high prices, and the failing fertility of the orchard land was still more lowered by a system of heavy cropping between the trees without returning anything to the soil. Still the peach was planted, left to produce a few heavy crops, till it declined from sheer feebleness and want of sustenance. It was then the custom for orchardists to raise their own trees from seedlings, and the nurserymen collected the stones quite indiscriminately for raising stocks. Hence it is evident there were present all the conditions for passing on a constitutional debility of the parent trees in a greater or less degree to the seedlings. Still the system of allowing the tree to exhaust itself by heavy and repeated crops in a light soil was continued, and generation after generation of seedlings, each more enfeebled than its predecessor, at last produced a characteristic feeble and sickly stock of peach trees throughout the district. The great abundance of the fruit caused it to find its way into all the markets along the sea coast. The stones from the fruit thus introduced into the Northern States, being esteemed something better than those of home-growth, were everywhere more or less planted. They brought with them the enfeebled and tainted constitution derived from the parent stock. In the new soil they reproduced the old failings of their worn-out constitution, and thus, little by little, the morbid condition or the so-called "yellows" spread to the whole northern and eastern sections of the Union.

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* Fruit and Fruit Trees, pp. 584, 585.

From the history, let us turn to the nature of this enfeebled state of the peach tree. Every good gardener knows that if he desires to raise a healthy and vigorous seedling plant, he must select seed from a parent that is of itself decidedly healthy. Professor Lindley, in his *Theory of Horticulture*, justly remarks: "All seeds will not produce equally vigorous seedlings; the healthiness of the new plant will correspond with that of the seed from which it sprang." Again, the great Flemish pomologist, Dr. Van Mons, declares that the more frequently a tree is reproduced continuously from its own seed, the more feeble and short-lived do its descendants become. Moreover, the peach is peculiarly constant in the reproduction of any constitutional variation that may have arisen. A signal proof of this is seen in the nectarine, which is merely a variety of peach with a smooth skin, and not a distinct species at all, yet it is perpetually reproduced without reversion by sowing its seed. It is evident from these premises that the constant sowing of the seeds of an enfeebled stock of peaches would naturally produce a sickly and diseased race of trees. The seedlings would often appear healthy at first, but the taint will sooner or later show itself, and especially when the tree is allowed to produce an over-crop. That bad soil conditions and over-bearing will produce great debility in any fruit tree is matter of common observation. Even the apple, the hardiest of orchard trees, requires a whole year to recover from the exhaustion caused by an unthinned crop. The great natural luxuriance of the peach induces it actually to form new fruit buds while the branches are still loaded with fruit, and thus, if not restrained by pruning, is soon enfeebled.

These are some of the facts open to every-day observation which point towards this theory. The varieties most subject to yellows are those which produce the heaviest crops. Slow growing sorts and those which produce but sparingly, like the nutmeg peaches, are almost entirely exempt. We know an orchard where every tree has gradually died from yellows except one which stood in the centre. It is the Red Nutmeg, and is still in full vigour. It is certainly true that these sorts often decay and suddenly die, but it is always from the neglect which allows them to fall a prey to the peach-borer curculio. The frequency with which the peach-borer's work has been confounded with yellows by ignorant observers renders it difficult to arrive at correct conclusions respecting the supposed contagious nature of the latter disorder. It may be said in objection that a disease which is only enfeeblement of constitution would not result in speedy death. The answer is that the degree of debility produced in a single generation of trees would not have led to such effects, or to any settled form of constitutional disease. But the same bad management has been going on for nearly a century up to this day, the whole country over. Every year, in August, the season of early peaches, thousands of bushels of fruit showing the infallible symptoms of yellows are sold in the markets. Every year the collected stones of these peaches are planted, to produce in their turn a generation of diseased trees, and every successive generation is more feeble and sickly than the last. So feeble has the stock become that an excessive crop is too frequently followed by the yellows. In this total absence of proper care in selection of seed and trees, followed by equal negligence as to cultivation, is it surprising that the peach has become a tree comparatively difficult to preserve and proverbially short-lived? In Europe, the peach is always subjected to a regular system of pruning, and is never allowed to produce an over-crop. Its lavishness is kept under control. Now yellows are unknown in Europe, and notwithstanding the great number of American varieties of this fruit sent over and now growing there, the disease has never extended itself or been communicated to other trees, or even been recognised by English or French horticulturists."

It is scarcely possible to read this opinion of the veteran pomologist of America without recognizing that similar conditions have existed here in the Colony. Not one in a hundred has for himself made the observation that the peach is apt to ruin itself with over-bearing, and has therefore carried out a vigorous system of pruning back in winter and shortening in summer, to keep the output within the limits of the trees' powers. Not one in a hundred has trenched up the whole strip of land on which the trees stand and secured to them a free rapid drainage. Is it then wonderful that, encouraged to bear to excess, with roots weakened for want of free aeration and perpetually waterlogged once or more a week, the peach tree succumbs at last, and dies slowly of what we have called yellows, but which is really exhaustion above ground and root-asphyxia below?

If it be asked, what remedy is to be had for what has been taken at the Cape for yellows, the reply must be founded upon this view of its cause. The system or no-system of culture must be altered. If planted in the old way in holes, a French drain must be taken out along each row a little lower than the original bottom of the holes, connecting each, and having a good outfall. This prevents the mischief of waterlogging. The whole area of the trees must be dug with the digging fork—not with the spade—as deep as possible without getting seriously among the roots. A top-dressing of lime should be turned in at the same time, not so much for the purpose of adding to the food-constituents of the soil as to aid in making available the humus elements present, setting free potash, and, if the soil be clayey, flocculating its texture to admit air. The unhealthy parts of the tree should be cut away, and the whole gone over discreetly with the pruning knife to reduce the demands made upon the weakened root-system. Work of this sort is as interesting to the skilled gardener and the observant amateur, as the conduct of a difficult case is to a physician. But people who do not care much for their garden, and look on their trees merely as machines for saving market cost of purchased fruit, had better not try to bring them round. It would be far less trouble to stub every one of the unlucky victims of bad management completely out, and begin over again by trenching up, draining properly and replanting.

SELECTION OF SORTS.—Such parts of the country as belong to the coast region, and do not rise above 500 or 600 feet above sea level, have the best chances of topping the market with early sorts and securing the high prices brought by their first appearance. At higher levels, earlies are not of much account. They are elbowed out of competition when they appear by middle sorts from the lower and more precocious level, and they are very likely to catch a snap of late frost when blooming. This is the danger of our clear, cloudless nights in early spring. The heat of the day, accumulated in the earth, is radiated away rapidly into space when there are no clouds to send it back, and during the hour before dawn the mischief is done. It is "black frosts" due to radiation that mostly cut off the early blossoming fruits of the high veld. As to the modes of combating the evil by smudges of smoke and by netting, consult the *Agricultural Journal*, vol. v., p. 252. Peaches intended for canning should be white or yellow self-coloured sorts. Those which are red-stained at the stone colour the syrup. They are much better suited for drying, for the rosy tint on the inside curve has an inviting appearance. It cannot yet be said that known pedigree kinds have been to any extent recognised as peculiarly suitable to this or that special locality. No one has troubled himself about pomology and the climatic distribution of fruit sorts at the Cape, and nearly all the data are yet to be received and recorded.

On the Selection of Stocks for the Orange in the Southern United States.

Referring to the *résumé* of a U.S.A. Departmental Report on this subject in the *Agricultural Journal* of 19th December last, we add the following extract from the Year Book of the Department of Agriculture of U.S.A. for 1896.

STOCKS.

The kind of stock used for budding has considerable influence on the health, vigour and productiveness of the tree. As some stocks will not do well on certain soils and some varieties grow well only on certain stocks, it is desirable that the stock used for planting any given tract be carefully considered. The orange and pomelo, or grape fruit, are commonly budded on sweet-orange, sour-orange, lemon, or pomelo stock. If planting is to be done on rich, moist lowlands (low hammocks and flat woods) which are subject to foot rot, or *mal di gomma*, stock which is immune from this disease should be used. Sour-orange stock is the most resistant variety that has been found and usually gives the best results. Pomelo, or grape-fruit, stock is also quite resistant and is probably the best stock in foot rot regions where the soil is droughty at certain seasons of the year. It is a more vigorous grower than the sour-orange and resists drought better. Foot rot is common also on some flat woods and high pine-land soils which are dry and well drained, and in such localities the pomelo is probably the best stock for general use.

In the case of high and dry lands not much subject to foot rot, sweet-orange, lemon and pomelo are probably the best stocks. On dry lands, sour stock, although much used, does not always give satisfaction. Lemon stock, particularly the Florida rough lemon, is a very excellent stock for dry, sterile lands, as it is a very vigorous grower, doing fairly well in soil where the sweet-orange would perish. It is so easily injured by cold, however, that it is safe only in southern localities. Pomelo is also a more vigorous grower than sweet orange and is probably a better stock for dry lands, but it is more tender and should be budded near the ground or its use limited to southern regions. In regions where foot rot is prevalent, sweet-orange stock and lemon stock should never be used, as they are particularly subject to this disease. The lime, which is a very vigorous-growing stock, similar to the lemon, is used to some extent in southern Florida as a stock for the orange, and is said to be excellent for barren scrub land and rocky locations. The hardy trifoliate orange is used to a limited extent as a stock for the orange, but has not always given thoroughly satisfactory results.

Tangerine and China (Mandarin) do well on any of the stocks used for the common sweet orange, but as the grower usually desires to increase the size of these varieties it is probably preferable to bud them on rough-lemon stock. The Satsuma, which is a hardy variety, is very extensively budded on the hardy trifoliate orange, on which it is said to do well. It also gives good results on sweet-orange, which is probably the best stock to use in southern locations, but does not do well on sour-orange stock. Lemons are usually budded on rough-lemon, sour-orange, or sweet-orange stock, the rough-lemon being considered the most desirable, as it is the most vigorous grower. In places where foot rot abounds, sour-orange stock should be used.

In selecting stocks it is also important that the latitude and local climate be carefully considered. The various citrus species used as stocks for grafting or budding vary greatly in their resistance to cold. The following is a list of stocks commonly or sometimes used, and is arranged in order of hardiness, the hardiest being placed first: Trifoliate orange, sour-orange, bitter-sweet orange, sweet-orange, pomelo, rough-lemon (or lemon), lime, and citron. In localities where there is danger of severe freezes, no matter what stock is used, the point of union should be placed near or below the surface of the soil, so that the buds may be saved in case of freezes.

In regard to the effect of stock on the character of the fruit, it may be said that while some growers claim to have observed that the fruit is rendered coarser and thicker skinned by budding on vigorous, rapidly growing stocks, like the pomelo and the lemon, yet it is certain that the difference is very slight and in most cases hardly perceptible. In this connection all that needs to be considered is that stocks of this nature tend to produce rather larger fruits. While in some varieties this character is a disadvantage, it is, on the other hand, an advantage to have a vigorous stock, as in certain varieties this is necessary to insure fruitfulness. The varieties of the Navel orange are unfruitful on sweet or sour stock, but usually they are normally prolific if budded on rough-lemon.

SUMMARY.

Mr. B. T. Galloway, Chief of the Bureau of Plant Industry, U.S. Department of Industry, in reference to the Sour Orange as a Budding Stock, on October 28th, 1901, in response to a letter from the Agricultural Department of Cape Colony of September 25th, 1901, wrote as follows :—

Your communication of September 25th, addressed to the Hon. Secretary of Agriculture, requesting information concerning the behaviour of citrous fruits when budded on the Bitter Seville Orange stock, has been referred to this Bureau for consideration.

For a number of years past this Department has been carefully following the development of the citrous industry in Florida and California, and has given considerable attention to the question of the proper stocks on which to work the various citrous varieties. The work has been so extended that it is possible to give here only a summary of the conclusions.

The use of the so-called sour orange, which is one of the Bitter Sweet or Bitter Seville oranges grown in Florida, as a stock has been very extensive, and as a whole has given very excellent results. This stock is resistant to the disease known as foot-rot or *mal di gomma* and has been used largely on this account. It does very well on almost all orange soils and with almost all varieties with only a few exceptions. The Navel orange, which is rather a shy bearer, does not fruit well on this stock in Florida, and its use with this variety has been entirely abandoned in this State. In California, however, the Navel fruits very well on the Sour orange and its use as a stock has been very extensive there. In general in this country it may be said that on all low lands where the drainage is poor the Sour orange stock should be used. However, it is not as vigorous and rapid a grower as some other stocks, and on high well-drained land where foot-rot is not to be feared, it would probably be better to use some other stock such as the Sweet orange or Pomelo. Practically all varieties of the orange have been worked to a considerable extent on the Sour orange, as well as the Pomelo or Grape-fruit, the Tangerine, Mandarin, lemon, etc., and the general opinion of our best orange growers is that it is one of the most valuable stocks. The Satsuma, a variety extensively grown in northern orange sections, however, is generally reported as not bearing well on this stock.

Next to the Sour orange the Sweet orange stock has probably been used more extensively than any other, and it is claimed that almost all varieties do well on this stock. In some places the Sour orange as a stock is being replaced by the Sweet orange, which indicates that the former has not given the most satisfactory results.

The Pomelo or Grape-fruit, which is a very vigorous grower, has recently been brought into prominence as a stock, and some growers claim that it is particularly valuable where the soil is dry at certain seasons of the year. It has also seemed resistant to foot-rot and is doubtless a valuable stock to use under certain conditions.

Lemon stock has been very little used in this country and as a whole has not given good results, as it is so tender and so subject to foot-rot. There is a local variety, however, known as the Rough

Lemon, the parentage of which is obscure, that is very hardy and is being used as stock extensively in the most southern localities of Florida where there is no danger from freezing. This is a very vigorous grower and a good stock on which to work the orange in that section. In California, where conditions of soil and climate are so different and there is no danger from cold, there is no necessity of using the Rough Lemon.

Within recent years, since the destructive freezes of 1894-95, which so seriously injured the orange groves of Florida, the Trifoliate orange (*Citrus trifoliata*) has been used very extensively as a stock in northern orange localities, all the varieties of orange, Grape-fruit and Tangerine being budded on it. This stock has the effect of decidedly dwarfing the scion but at the same time forces it into fruiting early and is an excellent stock for productiveness. Varieties which are normally shy bearers are usually very prolific on this stock. The use of the Trifoliate, however, is so recent that we are unable to determine yet what its value is, though some of our best nurserymen are urging it as by far the best stock for northern citrous localities.

The Department has published two pamphlets entitled Methods of Propagating the Orange and Report on the Relative Merits of Various Stocks for the Orange.

Consular Reports on Citrus Culture.

In view of the interest attaching to certain vexed questions regarding citrus-growing, the Department of Agriculture a few weeks ago obtained information from the English Consulates in the principal seats of this industry. These details may profitably be compared with the full reports taken from American Consular sources of 1889-95, some of which were published in the *Agricultural Journal,* vol. iii., pp. 202 and 217, 1890-91.

Extracts from Reports by H.B.M.'s Consul on Citrus Culture in the Consular District of Palermo, for the Year 1895.

Although in some instances the Sicilian gardeners have preferred to stock their nurseries with young slips or with layers, the general inferiority of these two methods to the now prevailing system of raising trees from seed is so universally acknowledged that they are only adopted at present by those *laudatores temporis acti* who through prejudice, or in the hopes of earlier returns, sacrifice the permanent and sure advantages of raising from seed. The long and vigorous lease of life enjoyed by plants generated from seed, their consequent relative exemption from those numerous ailments and diseases which have of late years afflicted the orange and lemon trees of Sicily and of the Calabrias, are so many circumstances which explain the persistently abundant and valuable crops yielded by the offspring of seed, as contrasted with those produced by trees derived from slips, and this constant superiority in yield of the seed-grown trees over the slip-grown ones far outweighs the precarious advantages of a rapid but often rank growth of a precocious but usually sickly crop, ending always in a premature decay.

The best seed is considered to be that derived from the *Citrus bigaradia* or bitter orange, whose exceptional vigour will always afford the fairest hopes of a fine and healthy progeny. Even a 4-year sapling will endure repeated graftings and other operations, which it would be most dangerous to attempt on plants born of other seed, or derived from slips. The bud or scion engrafted on the *Citrus bigaradia* imparts, I am told, all the flavour inherent to the particular variety whence the graft is taken, to the stock, without impairing its native vigour.

The plant is usually able to support a graft after the completion of its fourth year, and the probabilities of success are further increased by the selection of the *Citrus bigaradia*, whose seed produces at once the most vigorous and earliest fruiting plant in this respect—indeed it precedes its congeners by over three years, commencing to yield on the completion of its eighth year. It is therefore a favourite subject for grafting. Independently, however, of the undeniable benefits derived from the association of the good qualities of this wild vigorous variety, and of the ordinary sweet specimen through the process of grafting, the question mooted by several cultivators in Sicily as to the propriety of according an exclusive preference to the one over the other should be answered negatively, the pros and cons with regard to such a preference in favour of the one species to the exclusion of the other being pretty equally balanced. For if the *Citrus bigaradia* gives earlier crops, the second yields more luscious and finer fruit. But if opinions differ as to the absolute superiority of the one over the other, there can be but one opinion with respect to the advantages of engrafting the wild variety with a scion of the sweet domestic species.

In our selection of a fitting individual, we should rely upon the long-tried experience of a veteran gardener, who will be able to discern at a glance those plants which, from their appearance, will furnish the best specimens of scions, and certain well-known kinds, such as the Calabrian orange, commonly called "a bicchiere," on account of its oval shape; or where lemon slips are required, the lumaria are highly prized.

Where bergamots are concerned, I have been assured that they can be budded freely and successfully on the orange stock, provided the patient is derived from seed, which seems, indeed, to be a condition precedent of vigour among trees of the citrus family. These remarks apply with equal force to the flaccid and short-lived citron trees, whose brief span of existence is somewhat extended in those cases in which they derive their origin from strong individuals of the orange variety, budded with scions of the citron.

From Sidney J. A. Churchill, Esq., H.B.M.'s Consulate, Palermo, Sicily, Feb. 11, 1902.

"I have the honour to inform you that the general practice in Sicily in regard to citrus fruit trees is to produce the stock from seeds of the *Citrus bigaradia* or sour orange. This stock should not be used for grafting purposes until it has reached its second or even its third year. Most methods of grafting are practised, but the favourite is that known as *à yeux* (al occhio) or rind-grafting; this giving the greatest measure of success. In about a fortnight the operation should show effects. The spring is the grafting time.

Prof. Arnao's handbook to the cultivation of the citrus is highly recommended."

From Edmund W. Smith, Esq., Acting Consul, H.B.M.'s Consulate, Tangier, Feb. 10, 1902.

"I find that the variety of orange found to give the best result for providing stock plants on which to graft the commercial varieties of citrus, is the bitter orange tree of Gallesio. This is extensively cultivated for the purpose, as well as for the exportation of its fruit, both here and in the great orange-producing districts of Spain, viz., Valencia, Malaga, &c. . . It is specially adapted for growing on heavy sand, and resists disease.

The sweet orange is also often used for stock purposes and produces a finer orange, but the plants are not so robust. This plant thrives on lighter sands."

From A. Fred. Ivenz, Esq., H.B.M.'s Vice-Consulate, Valencia, Spain, Feb. 18, 1902.

"According to the local practice in this orange-growing district, the best class of stock upon which to graft is that of the "Poncilero," the Spanish name for a variety of the citron tree. If shoots of the Bitter Seville orange are grafted on the Poncilero, the fruit resulting therefrom is the best and strongest kind of sweet orange and is more exempt from *mal di gomma,* smut, and other blights arising from excess of damp than any other grafts. It is chiefly recommended for moist soils. Bitter oranges are not much cultivated in the province of Valencia, but the custom is to sow the pips of the bitter oranges. Grafting is not practised here in this case, 'for a bitter orange crop.'"

From E. J. L. Merkeley, Esq., H.B.M's. Consul-General, Tunis, Feb. 25, 1902.

"In substance it would seem that the stock used here is the Bigaradier, or *Citrus bigaradia,* commonly called bitter orange; the grafting is performed at two seasons of the year, viz., between April and June, and again between September and November. It seems to be thought that perhaps an injudicious time of the year is selected at Cape Town, and that it might be useful to make experiments in that direction, if they have not already been undertaken. It is also suggested that the *Citrus Japonica*, which is a strong plant, might be tried as stock, but it is to be feared that its resistance to the *mal di gomma* would be found inferior to that of the bigaradier."

From Edward E. Berry, Esq., H.B.M.'s Vice-Consul, Bordighera, N. Italy, Feb. 27, 1902.

"I have made enquiries from the chief authorities on fruit culture in this neighbourhood, including Sir Thomas Hanbury, Cav. Ludw. Winter and Dr. Calvino, Director of the School of Agriculture for the province of Porto Maurizio.

Everybody whom I have consulted agrees that the best stock for grafting purposes is the Bigaradier Orange (*Citrus bigaradia*), and that for lemons and mandarin oranges this stock is *invariably* used locally; though the sweet orange (*Portogallo*) may also be grown direct from seed.

There appears to be some difference of opinion amongst the local growers as to the best mode of obtaining the Bigaradier stock, many of them planting branches of the old trees (layers). This system is however considered bad by experts, who say that the trees thus obtained are extremely liable to disease, and that by far the best plan for obtaining new stock is to raise it from seed. The best results are obtained in the following way:—

Sow from November to April in a suitable bed, well dug and manured with thoroughly decayed stable manure, covering the seeds to a depth of 3-4 centimetres (say 1¼ to 1½ in.) with fine soil, watering occasionally if the weather be dry. After a couple of months the seeds germinate, and the seedlings must be watered frequently and the ground kept well hoed and weeded. After a year the young trees are transplanted to another bed which has previously been trenched to a depth of 80 centimetres (say 31 inches) and well manured. The plants are put in at a distance of 50 centimetres from each other (say 20 inches) in every direction, thus forming diagonal rows, or the quincunx pattern, thus—

The plants should be tied to stakes, and the lateral buds nipped off to strengthen the main stem, and the terminal point should be cut off for the same reason."

From F. Hay-Newton, Esq., H.B.M.'s Consul, Algiers, March 3, 1902.

"I beg to transmit herewith copy of a letter from Dr. Trabut, of the *Service Botanique du Gouvernement Général d'Algérie*, giving his experience, together with a short treatise by that gentleman on the citrus of Florida."

Translation of Dr. Trabut's letter.—In Algeria it is an admitted fact that the Bigarade or Bitter Orange is the only sort capable of forming a good grafting-stock. At Boufarik, the orange trees on sweet orange stock and the sweet orange seedlings are in course of dying out, while in the very same orangeries the graftlings on the Bigarade are resisting the *mal di gomma*. I am the only one here who has tried the "rough lemon" of Florida, obtained by seeds and cuttings, but my experience is not sufficient for me to pronounce definitely upon it; nevertheless, this citrus sort is of great interest to regions like ours.

Phylloxera.

Phylloxera, discovered in 1885 in the Colony, has here, like in all other countries, been found to be the primary cause of a wholesale destruction of vines, the vines dying from exhaustion and starvation on account of first the finer and then the stronger roots having decomposed. When a vine is infected, we find the tender extremities of the finest rootlets to suffer first, forming at their ends wart-like swellings of the well-known shape, of a light yellow and, later, brownish, colour. From such swellings or nodules other tiny rootlets are frequently formed, which, in their turn also attacked, exhibit secondary excrescences of the same nature. Gradually the infection increases, and the insects, now present in large numbers, infest the stronger roots, producing tuberous swellings of a spongy nature which soon begin to rot. This process of rotting then spreads and increases, so that at the time of death a vine has but a very few roots left, quite unable to supply the nourishment.

The rapidity with which the destruction progresses depends exclusively on the nature of the land, that is to say, in heavy clay land the destruction is quickest, next follows alluvial and gravelly soil, then sandy land. No immune soils have so far been observed as are found in France and Hungary, but there is every evidence of the destructive powers of Phylloxera decreasing with an increase of sand in the soil.

Conjointly with the symptoms afforded by the roots, external symptoms also occur, consisting briefly in the production of slender unhealthy-looking shoots, decreasing year after year in length and, what is a more characteristic sign of the presence of Phylloxera, in thickness, so that the circumference of an annual shoot at its base is considerably smaller than that of a shoot of the previous season. Such shoots are either barren or carry a few badly nourished grapes, and their leaves assume prematurely a yellowish autumn tint, dropping off about March or April. In consequence of this latter circumstance, such vines are frequently leafless at about the end of

March, in which case they put forth some new growth soon after the first rains, when the weather is not yet cold enough to retard vegetation.

As a rule, the presence of Phylloxera can reliably be recognised only by the condition of the roots, but the external symptoms, as afore described, are valuable indicators whenever it is necessary to locate the pest without resorting each time to an inspection of roots. In the event of one depending partly on external symptoms, one must bear in mind that, whilst the same symptoms occur in other diseases, notably in the case of vines suffering from "Vrot-pootje"—*Wurzelfaule*—*Pourridie*—the presence of Phylloxera shows in patches which increase and extend in concentric circles. Hence, after a lapse of two or three years from the time the insect made its appearance in a vineyard, a number of circular patches would be seen, each with a few dying or dead ones in the centre, and around them a ring of vines in their last stage, followed by a ring of yellowish-looking trees, and beyond that, another circle of vines still thriving luxuriantly but infected, and on the point of presenting next year the same appearance as its neighbours towards the centre of the patch.

The attitude of the Cape vine-grower towards the Phylloxera question has undergone many changes. At the time the presence of Phylloxera at the Cape was discovered, and when the destruction of infected vines was still compulsory, growers generally disbelieved the possibility of such a small insect doing material damage, and they were therefore disinclined to take precautionary measures, of their own. When, thus, after a number of years, the protective policy of the Government was abandoned, the pest spread rapidly, and then only growers made attempts at retarding the progress of the insect by destroying infected vines by means of bisulphide. In the majority of cases this failed to give satisfactory results, mainly owing to the want of combined action and the disinclination of farmers to destroy other than visibly infected vines. In consequence, Phylloxera continued spreading, and farmers were ultimately forced to recognize the practical value of American vines, against which they had, until then, a great distrust. Since that period, farmers generally look upon Phylloxera as a pest which need no longer be feared, and, on appearance of it on their farms, take no other steps but to make provision for replanting, by means of grafted vines, what has been destroyed of ungrafted vines. The grafted vines they either produce themselves or purchase them in the existing nurseries at a rate varying between £10 and £15 per 1,000 vines.

The replanting of destroyed vineyards is usually done the same year the dead vines are taken up, but it is undoubtedly preferable to select, where such is possible, an entirely new piece or to give the old land at least one year's rest, trenching it, however, the year the vines are removed. In a few individual cases where the rather sandy and permeable nature of the soil permitted it, [illegible]ers successfully retarded rapid progress of the disease for a number of years by inundating individual centres after the vintage.

Of the various methods of grafting the American vine, two only have been adopted, viz: (1) the grafting *in situ*, and (2) the grafting of cuttings in the hand and cultivating same for one season in a nursery until the American and European vines have joined, when such grafted vines are taken up and transplanted in the vineyard. Green or summer grafting is also practised in a few instances with satisfactory results.

Grafting *in situ* consists in the planting of American vines into the vineyard and grafting them the following year, usually by means of cleft grafting, to the varieties of European vines commonly cultivated at the Cape. This system, suitable to light sandy soils, has failed to give satisfaction in clay lands, unless the graft is covered with light sandy soil purposely brought to the vineyard. As, even with the best of success, a proportion of grafts will not take, and as grafting the same vines a second time has been found inadvisable, provisions are in most cases made to put in the place of such failures grafted vines from the nursery so that the whole vineyard is completed in the second year.

The time of grafting is, according to the district, the end of August to, at the outside, the beginning of October, an early start being usually made in the inland districts, whereas nearer to the sea late grafting has given satisfaction. After grafting, the vine is completely covered with a mound of loose soil to protect the scion until it has connected with the American stock, when it is removed to destroy the roots formed from the scion. This operation is usually conducted during January.

In nursery grafting, cuttings of about 9in. in length are commonly used, it having been found disadvantageous to use longer ones as they are difficult to handle and root less readily. Cuttings, like scions, generally cut some time before grafting, must be suitably preserved by putting single layers of cuttings between layers of sand in an excavation in the open land. Over such excavations a rough thatch roof is erected to keep off sun and rain, and around them trenches are made to carry off superfluous moisture.

When the time of grafting comes round—July—September, according to district and numbers to be grafted—the cuttings are taken out, sufficient at a time to meet the day's requirements, and washed to get rid of all dirt. The buds are then destroyed with the exception of the bottom one. This is done to prevent suckering of grafts in the nursery. The cuttings are now placed in water, remaining there frequently for 24 and more hours, in any case until needed for grafting.

The scions are prepared in the same way, scions of two eyes being mostly used.

The method of grafting is the so-called whip-grafting, and the grafts are either tied with raffia or twine. The former is given the preference in the better nurseries, and, where grafting is started early in the season, it is made more durable by soaking it for one day in a 3 per cent. solution of sulphate of copper, the raffia being, however, well washed in running water before it is used, to remove all superfluous bluestone.

When grafted, the vines are tied up in bundles of ten and again placed as before under sand in the excavation, to remain there until the time for planting in the nursery has come, viz., the end of August—September. For nursery purposes, a more sandy than clayey piece of land is as a rule chosen, and such land is, just prior to planting, thoroughly prepared by deep cultivation or hand trenching to about 12in. Instead of planting grafts into trenches as is customary in most European nurseries, most growers at the Cape merely mark off the distances of the rows, then insert an ordinary spade perpendicularly into the ground on the line, and, by moving it backward and forward, open the ground along the line, sufficiently to admit of placing the grafts. The placing of the grafts is so done that they stand about 5in. from each other and the point of union is level with the surface; the rows being from 18in. to 24in. apart. After this, the spade is again forced down into the ground, this time just behind the grafts, and by a forward movement the vines are made to stand firm. The grafts are now covered with earth, taken from between the rows, and the whole process is completed. During summer, one or two irrigations are usually applied, according to the district and the nature of the soil, but it is generally better to cultivate such grafts without irrigation at all, wherever this is possible. At about the end of January the earth cover is removed and every root formed from the scion is destroyed, no further attention being required after this operation until the time when the grafts are taken up—from June to July.

The average percentage of success varies according to the district, nature of soil and varieties of American and European vines grafted, from 30 to 50 per cent.

Some farmers, particularly farmers in the drier districts, have found it more advantageous to plant their American vines first in the nursery and graft them *in situ* by means of cleft grafting the following season, treating them otherwise in the same way as afore described.

The following are the principal varieties of American vines worked with in the Colony, viz :—

1. Riparia Gloire de Montpellier and Riparia Sauvage.
2. Rupestris Metallica, Rupestris Large Leaf and Rupestris Monticola or du Lot.
3. Aramon x Rupestris, Gaurin No. 1.
4. Jacquez.

Riparia.—This variety is used in deep, fertile, fresh soils; it grafts well and gives early bearing vines of a moderate growth. It is, however, possessed of the one great disadvantage that it does not give a strong stem, in consequence of which, bearing vines cannot so well stand the force of strong winds.

Rupestris.—Rupestris Metallica and Large Leaf are almost of equal value. Metallica grafts more readily than Large Leaf but is less suited to stiff land than the latter. The variety Muscat of Alexandria, locally known as "Hanepoot," does not answer on these sorts. Rupestris varieties are generally put on the drier lands.

Rupestris Monticola or du Lot is a valuable variety for dry hills, provided there is sufficient depth of soil. It should never be planted in low-lying land, as its roots strike deep and are thus likely to reach water, when such vines will suddenly die.

Aramon x *Rupestris* is our strongest growing variety, and, more than any of the previous kinds, suited for stiff-clay soils. Though a hybrid between the American and European vine, it has successfully been cultivated since 1893. Muscat of Alexandria is, like on Rupestris, a failure.

Jacquez.—This variety is almost exclusively used for grafting Muscat of Alexandria. It has given every satisfaction since 1889, and there is no reason to doubt its resistance to Phylloxera. It grows, like Aramon x Rupestris, on almost any kind of soil.

As a whole, grafted American vines have been a great success here, mainly on account of the absence of large quantities of lime in the soil, and it is evident that the fertility of grafted vines is much greater than that of ungrafted ones.

Carbon bisulphide has never been employed in this Colony to give vines a so-called cultivation treatment—*Culturverfahren*—as the cost of application was found to be too great and not commensurate with the price of wine. It has, however, been used for about eight years in retarding the progress of the Phylloxera by destroying all infected centres discovered during the inspection of vineyards then carried on by the Government, and there is every evidence that the system was most effective, as, shortly after these methods had been discontinued, Phylloxera spread rapidly. As a rule, 100 grammes of bisulphide were approximately used per square yard in order to destroy and kill infected vines. In many instances, however, 200 and even more grammes had to be used to bring about the desired effect, notably in low-lying vineyards of a clayey nature. The total quantity so used was always distributed over a number of holes around the vines, usually from 9 to 12 according to the distance at which trees had been planted, so that each one was surrounded by so many holes, each having received its proportionate share of bisulphide. The bisulphide was forced into the ground by the well-known French injecting pump, which admits of regulating the dose.

As bisulphide is very volatile, it diffuses at once in the soil, unless the ground is too wet, and, being poisonous to animal life as well as vegetable life, the gases will destroy both the insects and the vines. The destruction of known centres of infection, and, with that, reducing the chances of an infection spreading, appears to be the only gain, inasmuch as no country has as yet succeeded in ridding itself by this system of the Phylloxera disease after the pest has established itself for a number of years. C. MAYER.

VETERINARY.

A Possible Cure for Redwater.*

As is well known, arsenic has from time to time been preconised in the treatment of malarial fever, but its effects are so uncertain and its use attended with so much danger to the patient that it has always been regarded as being more an adjunct to than a substitute for quinine. Its tonic and repairing action has been generally admitted but its febrifugal properties considered very doubtful.

When in 1898 M. Gautier discovered the therapeutical effects of cacodylates, he attempted to apply arsenic in this new form to the treatment of malaria, with successful results in two inveterate cases.

Since 1898, other organic compounds of arsenic have been studied with the idea that quinine might possibly be superseded by cacodylates or other organic compounds in which arsenic has lost its toxicity.

The simplest of these compounds is methylarsenate of soda. $As (CH_3) O_3 Na_2$ now known as "arrhenal." After having ascertained upon animals that its toxicity is very feeble[1] its action was studied in various diseases. These researches will form the subject of other papers[2], the action of the drug in malarial fever being alone considered in the paper now abstracted.

A small quantity of the methylarsenate was forwarded to Dr. A. Billet, Chief Medical Officer in the Constantine Military Hospital, who is an authority on malarial fever, and practising in a country where the disease is endemic and frequently assumes grave forms was well fitted to follow the study.

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* Abstract of a paper *On a very powerful specific treatment of malarial cachexia.* By M. Armand Gautier. (*Comptes rendus* cxxxiv. p. 329, 10th February, 1902)

(1) A dog weighing 15 kilos. resisted a subcutaneous injection of 50 centigr. of the salt. Six white mice were killed only after the ingestion of 56 grammes of the salt per kilogr. of their weight.

(2) A paper by M. Mouneyrat since published (*Comptes rendus*, 17th March, 1902) shows perhaps equally remarkable results in the treatment of 120 cases of consumption by arrhenal supplemented by nucleinic acid, or "histogenol," an easily assimilated organic compound of phosphorus designed to repair the great waste of phosphates which occurs during the course of the disease.

Seeing the seriousness of African malarial fever, it was agreed to administer the salt in doses of 5 to 10 centigrammes, which are painless.

The results achieved have exceeded all expectations. Nine patients treated, who had remained refractory to quinine in large doses, were rapidly cured. Particulars of some of the cases follow :—

Case 1. Tertian type, with malignant parasites. Max. temp, 40°.8 C. One injection of 5 centigr. Specific hæmatozoa disappeared from the blood within 24 hours and cure was maintained.

Case 2.—Quotidian type, with pigmented leucocytes. Max. temp. 39°·4 C. One injection 5 centigr. results in complete apyrexia from day following and disappearance of the specific parasites.

Case 3—.Tertian form. Numerous small parasites. Max. temp. 40°.8 C. Advanced cachexia. One injection 5 centigr. Hæmatozoa nearly disappeared next day, but reappeared in fairly large numbers a day later, without, however, causing a new attack. A second injection of 5 centigr. is followed by cure.

Case 4.—Quotidian fever. Numerous small parasites. Max. temp. 39°·6 C. Marked cachexia. 1st injection 5 centigr. on 19th Jan., followed by gradual decrease of hæmatozoa. 2nd injection 5 centigr. on 21st resulting in complete cure.

Case 5. Quotidian type. Small parasites. Crescents fairly numerous. Advanced cachexia. Max. temp. 40° C. 5 centigr. injected on 23rd Jan., 75 milligrammes on 24th and on 25th. Apyrexia till 28th, but there is an attack on that day. On 29th 5 centigr. are injected and 75 milligrammes on the 30th, this time by the mouth. Apyrexia since 28th January.

Case 6. Tertian fever of a malignant type. Max. temp. 40°·8 C. Profound cachexia. Parasites numerous in each field of the microscope. 5 centigr. are injected in apyrexia on the 19th. Relapse on 20th. Second injection on 21st in apyrexia. A few parasites still in the blood. Slight attack on 21st on account of which renewed injections of 5 centigr. on 22nd, 23rd and 24th Jan. From 21st parasites gradually disappear, and completely on 23rd. Apyrexia since 22nd.

Case 7.—Quotidian attacks, very severe, of malignant typhic type. Max. temp. 40°·9. Profound cachexia. Small parasites very numerous, with some crescents. 1st injection 17th, 2nd 19th in apyrexia. Relapse on 20th. 3rd injection 5 centigr. on 21st. Renewed attack on 21st and 22nd, whence 4th injection of 5 centigr. on 22nd. Parasites then all disappear, apyrexia becomes complete and cure is maintained.

Thus, in spite of the use of doses purposely small, as was meet in the cautious trial of a new drug, the patients, even those with quotidian fever of a pernicious type, have been rapidly cured by one, two or rarely three or four injections. The repetition of the injections would probably not have been needed had the salt been administered in doses of 10 or even with the more severe cases 15 centigrammes, which as a rule would be well tolerated. In all the cases quinine had been found powerless to effect a cure or cause the complete disappearance of the specific hæmatozoa. The new treatment seems therefore more powerful than quinine medication.

There are other advantages over quinine. In marked contrast with what occurs in the ordinary treatment, patients treated by methylarsenate of soda can take food readily, the furring of the tongue disappears and appetite and strength are rapidly renewed.

Lastly, the deglobulization of the blood which is augmented by each attack, and is not arrested by ordinary quinine medication, even using large doses, not only is arrested by the methylarsenate but actually replaced by a rapid regeneration of the red blood cells. In a word, the arsenical salt entirely does away with malarial anæmia.

A blood count showed that within 48 hours, the number of red blood cells per cubic mm. rose in one case from 3,844,000 to 5,022,000 and in another from 2,740,000 to 3,420,000.

M. Billet has observed that under the influence of the arsenical salt, the mononucleated leucocytes, particularly the large ones, which are special phagocytes of the malarial parasite, increase rapidly, reaching a proportion of 68 per cent., of which 28 per cent. are large cells. This phenomenon is that which quinine induces. The process of the specification of the new drug appears therefore to be the same as that of quinine.

It remains to determine the most favourable doses, whether the drug is introduced by subcutaneous injection or by way of the mouth. Other arsenical preparations might also be examined, including cacodylates, to determine whether any are more active. Lastly, there seems to be room for the study of the effects of these organic arsenical compounds in continued and eruptive fevers. This is what M. Gautier has undertaken in collaboration with others.

H. G. F.

Stock Crossing Foreign Borders.

GERMAN SOUTH-WEST AFRICA.

The *Deutsches Kolonialblatt* for the 1st ult. contains the text of a Decree of the Governor of German South-West Africa, issued with a view to the prevention of cattle diseases in the Protectorate. The following are the principal provisions of the Decree :—

The importation into the Protectorate of animals suffering from any contagious disease is forbidden.

In the case of imported horses, donkeys, mules, hinnies, cattle, sheep, goats and pigs, the importer is required to produce the following certificates :—

(*a*) A certificate from the proper authorities at the place of origin, stating that no contagious diseases affecting the particular kind of animal to be imported has occurred at that place.

(*b*) A certificate signed by the police authorities at all the stations on the route followed by the animals up to the frontier of the Protectorate, stating that the animals have not, during transit through their districts, touched any place at which the existence of contagious disease has been proved.

(*c*) In the case of animals imported from Europe an additional certificate is required, showing that the animals were inoculated with tuberculin before embarkation, and that no rise in the warmth of the body exceeding 0·5 degrees has taken place.

The notice announces that a *précis* translation of the regulations containing a list of the diseases declared contagious, may be seen on application at the Commercial Intelligence Branch of the Board of Trade, 50, Parliament Street, London, S.W., any day between the hours of 10 a.m. and 5 p.m.

COUNTRY REPORTS.

East London, Ward 1.

THOS. H. WARREN, F.C., 2nd April, 1902.—March, like the preceding two months, was an excessively dry month. There were some light showers on the 26th and on the Saturday night previous. There are, of course, no crops. The country was parched and black and brown from burning by fire and the sun. Water is very scarce. However, these showers have changed the colour of the veld; the black is becoming green and the old brown grass is looking fresher. All the rain that fell in the locality soaked into the ground. The rain has added nothing to the water supply, which is very deficient and in many instances decidedly bad.

East London, Ward 2.

E. W. HOLDSTOCK, F.C., 31st March, 1902.—The prospects for the months of February and March are very discouraging. There has been no rain, and farmers are not able to do anything. Grass and water are scarce. A thunderstorm in the upper part of the Ward gave the farmers a little fresh water for their stock. Locusts in the voetganger stage are in parts of the Ward. Some farmers are destroying them by burning, but others take no notice of them. Cattle are healthy and in fair condition. There have been one or two cases of gall and spleen-sickness.

East London, Ward 3.

THOS. WILLOWS, F.C., 31st March, 1902.—A heavy thunderstorm passed over the upper part of the Ward on the 15th inst. and furnished a plentiful supply of water for stock. The veld also has improved, and in parts fields have been ploughed with a view to sowing oats next month. A few light showers have fallen along the coast, just sufficient to brighten up the veld. There is nothing to add to my report for last month, except that beer drinking has almost ceased owing to the majority of natives being short of corn, and, with a few exceptions, no mealies or Kaffir corn will be reaped this season.

Maclear.

J. S. Simpson, Act. R.M., 8th April, 1902.—Fairly good rains fell in the upper parts of the district, but not sufficient in the lower parts, and farmers' winter crops there are suffering accordingly. Stock are reported doing well.

Matatiele.

J. F. C. Rein, R.M., 31st March, 1902.—Rainfall has been scanty for some time past and the crops and veld are alike in a bad way. Towards the end of March, however, and since then, rain has fallen more or less from time to time and there will be a little grass for winter, and the yield of crops will, I think, be about one-half. No outbreaks of disease amongst stock have been reported during the past month.

Mount Ayliff.

E. Barrett, Act. R.M., 31st March, 1902.—The agricultural outlook has been considerably improved during the past month. There have been plentiful rains, which have not only done much good to the crops but have practically ensured a good veld for the stock in the approaching winter. There are several areas under quarantine for lung-sickness, but the disease does not appear to be of the most virulent type.

Mount Currie.

A. Rein, Act. R.M., 4th April, 1902.—Plentiful rains, following those in previous months, continued to fall during March. Pasturage is in capital condition and should carry us well into the winter. A terrific hailstorm passed over the district on the 30th ultimo, causing considerable damage to crops, fruit and buildings. Lung-sickness has evidently quite died out within the municipality, there having been no further cases for over two months; and in the district only one farm remains in quarantine, the last case having occurred on the 24th February last.

Mount Fletcher.

H. C. S. Garner, Act. R.M., 29th April, 1902.—Splendid rains have fallen during the month, but am afraid too late to save the crops. The natives are very busy breaking up new lands, and stock are looking very well. Lung-sickness still appears here and there.

Mount Frere.

H. B. Garner, Acting R.M., 7th April, 1902.—The weather during the past month has been more favourable to growing crops than that during the previous three months. The prospects of a good harvest are not as bright as they were some little time ago. Lung-sickness is still affecting cattle in the district. Pasturage is plentiful, and all stock are in good condition.

Qumbu.

H. H. Bunn, Act. R.M., 2nd April, 1902.—Crops in various parts of this district are excellent and there should be a good yield of Kaffir corn and mealies. Oathay is being freely offered for sale. Pasturage is excellent and sheep and cattle are doing well.

Tsolo.

W. M. Carlisle, Act. R.M., 4th April, 1902.—There is every appearance of good crops of mealies and Kaffir corn. Rains have fallen in time to save those crops. Stock in good condition, very little disease amongst them. Pasturage is very good.

Umzimkulu.

Capt. E. J. Whindus, R.M., 1st April, 1902.—Rain to the extent of 2¾ inches fell during March, which has had the effect of keeping pasturage fresh and will do a great deal of good to standing crops. All stock are in good condition and free from disease of a serious nature. No locusts have made their appearance. I hear that in several parts of the district "grub" has done damage to mealie crops; if this becomes general the yield will not be as good as was anticipated.

Return of Fruit Exported

DURING THE MONTH OF MARCH, 1902.

Port.	Variety of Fruit.	No. of Packages	Weight in lbs.	Quantity.	Declared Value £	s.	d.
Cape Town ...	Grapes . .	3941	90,352		1650	7	0
	Plums ...	351		13,880	128	5	0
	Pears ...	175		4,176	63	0	0
	Peaches .	90		2,180	52	5	0
	Pineapples ...	24		144	8	10	0
	Quinces ...	20		2,000	20	0	0
		4,601	90,352	22,380	£1,922	7	0

Artificial Manures.

The annexed list showing the agents from whom the various artificial manures may be obtained, and the current prices, is publiseed for the information and guidance of agriculturists.

Full particulars as to the composition of the respective fertilizers can be obtained on application to the agents; and attention is also invited to the analyses published in the *Agricultural Journal* of 9th January, 2nd April and 11th June, 1896; 30th Sept., 1897; 27th Oct., 1898; 13th Agril, 6th July, 1899 and 18th July, 1901.

LIST OF FERTILIZERS.

Attwell & Co., Cape Town. (Agents for Alex. Cross & Sons, Ltd., Glasgow.)	Special Root Guano ..	£6	10	0	per ton of 2,000 lb,
	Potato and Grain Guano ..	8	5	0	" "
	Nitrate of Soda	12	0	0	" "
	Superphosphates 39/40 per cent ..	6		0	" "
	Scotia Basic Slag (cont. 30 per cent. Tribasic Phosphate of Lime)	4	15	0	"
	Sulphate of Ammonia ..	0	19	6	per 100 lb.
	(Prices free on trucks, Cape Town)				
Jas. Searight & Co., Cape Town.	No. 1 Superphosphates (containing 12·14 per cent. Phosphoric Acid soluble in water, being equal to 26·30 per cent. Tribasic Phosphate of Lime). ..	£5	0	0	per ton of 2,000 lb.
Jas. Searight & Co., Cape Town.	No. 2 Superphosphates (containing 14·16 per cent. Phosphoric Acid soluble in water, being equal to 30·35 per cent. Tribasic Phosphate of Lime). ..	5	10	0	
	No. 3 Superphosphates (containing 17·18 per cent. Phosphoric Acid soluble in water, being equal to 37·39 per cent. Tribasic Phosphate of Lime). ..	£6	0	0	per ton of 2,000 lb.
	Vine Fertilizers	9	0	0	"

A reduction of 5s. per 2,000 lbs. is allowed on orders of 100 bags or more. Special rates can be arranged if delivery is taken ex importing steamer, the goods being trucked at Docks.

Woodhead, Plant & Co. Cape Town.	Thomas' Phosphate Powder	£4	15	0	per ton of 2,000 lb.
	Superphosphates	5	15	0	" "
	Nitrate of Soda	14	0	0	" "
	Muriate of Potash	16	0	0	" "
	Sulphate of Potash	16	0	0	" "
	Wheat Fertilizer	8	10	0	" "
	Kainit ..	4	15	0	" "
	Potato ..	1	15	0	per 200 lb.
	Vineyard Manure	1	15	0	"
	Tobacco Manure	1	15	0	"
	Sulphate of Ammonia	1	2	6	per 100 lb.
	Subject to a discount for cash.				
De Waal & Co., Cape Town.	Jadoo Fibre	10s. 6d. per bale of 100 lb.			
White, Ryan & Co., Cape Town.	Potato, Vegetable and General garden	£8 10s. per ton of 2,000 lb. If less than ½ ton 18s. 6d. per bag of 200 lb.			
	Pure Ground Bone	£5 10s. per ton of 2,000 lb. If less than ½ ton 18s 6d. per bag of 200 lb.			

White, Ryan & Co., Cape Town.	Quick-acting Bone and Potash Mixture	£7 per ton of 2,000 lb. If less than ½ ton 16s. per bag of 200 lb.
	Selected Bone Meal for Cattle, Horses, Pigs and Poultry ..	15s. 6d. per 100 lb.; special price per ton.
	Bone Grit for Fowls ..	12s. 6d. per 100 lb.
	Superphosphates ..	Wholesale only.
Malcomess & Co., E. London.	"Malcomess" A. Fertilizer, for Potatoes, Mealies, Vegetables, Orange and other trees ..	£9 per ton of 2,000 lb.
	"Malcomess" B. Fertilizer, for cereals, especially wheat ..	£9 per ton of 2,000 lb.
	Accompanied by guaranteed analysis by Prof. Hahn ..	(less 5 per cent for cash).
James Flower & Sons, Cape Town.	"H.B.T." Gypsum	£8 10s. per ton of 2,000 lb.
	Pure Ground Bone Meal ..	£8 10s. " " (in bags f.o. trucks—Cape Town).
Government Guano :—	Ordinary Guano ..	£6 10s. per ton of 2,000 lb. or 13s. per bag of 200 lb.
	Rock Guano ..	£6 17s. per ton of 2,000 lb. or 13s. 9d. per bag of 200 lb.

For use within limits of Colony.
Price includes delivery at Cape Town Railway Station.

D. E. Hockly & Co., East London.	"Hockly's Special Fertilizer." A complete manure for all crops	£9 per ton of 2,000 lbs. less 5 per cent for cash.
	Pure Bone Meal	Special Price.

Feeding Stuffs.

ENGLISH PRICES per ton of 2,240 lbs.		£	s.	d.		£	s	d.
Bran, London Broad		5	2	0	to	5	12	0
Linseed Cake, London made	ex mill	8	0	0	"	8	5	0
American	ex ship	7	0	0	"	7	2	6
Russian (in bags) ..	ex dock	7	15	0	"	8	0	0
Calcutta		7	15	0	"	8	0	0
Cottonseed Cake, London made .	ex mill	4	7	6	"	4	10	0
Decorticated ..	ex dock	6	7	6	"	6	10	0
Meal		6	5	0			--	
Rape Cake, East Indian .. .		4	5	0			—	
Maize, English Germ Meal	ex mill	5	7	6	"	5	10	0
American .. .	c.i.f.	5	7	6	"	5	10	0
Rice Meal, Rangoon	ex ship					4	15	0
Locust Beans, Cyprian		5	6	0		5	12	0

Mark Lane Express, April 17th, 1902.

The Feather Market.

Messrs. Wm. Spilhaus and Co. report under Saturday's date, April 26, as follows:—

Ostrich Feathers.—Owing to small supplies and the quantity offering not being sufficient, there has been no market this week.

	£	s.	d.	£	s.	d.
Whites (primes)	12	0	0	15	0	0
Firsts (super)	9	10	0	11	0	0
Firsts (ord)	8	0	0	9	0	0
Seconds	6	0	0	7	0	0
Thirds	4	0	0	5	0	0
Inferior and stalky	2	0	0	2	10	0
Byocks	1	10	0	6	0	0
Feminas (super)	7	0	0	9	0	0
Firsts	5	0	0	6	0	0
Seconds	3	10	0	4	10	0
Thirds	2	0	0	3	0	0
Inferior and stalky	1	0	0	1	5	0
Dark	3	10	0	5	0	0
Spadonas (White)	1	15	0	2	5	0
Light and Dark	0	10	0	1	0	0
Boos (White)	1	10	0	1	15	0
Light	1	2	6	1	7	6
Black Butts	0	10	0	0	12	6
Dark	0	7	6	0	12	0
Inferior	0	4	0	0	6	0
Blacks (Long)	4	0	0	5	0	0
Long Medium	2	0	0	3	0	0
Medium	1	0	0	1	10	0
Superior Short	0	10	0	0	15	0
Ordinary Short	0	7	0	0	9	0
Long Floss	1	5	0	1	10	0
Medium Floss	0	7	6	0	12	6
Short Floss	0	3	0	0	5	0
Drabs (Long)	2	10	0	3	5	0
Long Medium	1	5	0	1	15	0
Medium	0	12	6	1	0	0
Superior Short	0	5	0	0	7	6
Ordinary Short	0	2	0	0	3	0
Long Floss	1	5	0	1	10	0
Medium	0	7	6	0	12	6
Short	0	2	0	0	3	0
Inferior Long Blacks and Drabs	0	17	6	1	5	0
Inferior Floss, Blacks and Drabs	0	4	0	0	6	0
Wings	0	0	6	0	1	0
Chicks	0	1	0	0	1	6

GOVERNMENT NOTICES.

Seed Oats.

In connection with the Notice appearing in the *Agricultural Journal* of the 14th March, 1901, and subsequent issues, it is notified for the information of farmers and others interested, that a small quantity of "*Texas Rust-resistant*" and "*Algerian*" Oats raised from seed imported by the Government, is now available for distribution for experimental sowing, at 19s. per bag of 150 lbs.

Applicants must pay carriage from Cape Town Station.

As the quantity of seed at disposal is very limited, not more than 2 bags can be allowed to any one person.

Applications, accompanied by a remittance to cover cost of the seed, should be sent in, at once, addressed to the Under Secretary for Agriculture, Cape Town; and will be dealt with in the order in which they are received.

Cape Government Railways.

ADMISSION OF APPRENTICES INTO THE LOCOMOTIVE DEPARTMENT.

There are vacancies for Apprentices in the following Branches of the Locomotive Workshops at Salt River, viz.:—

Boiler Shop	Three boys for heating rivets and cleaning Boilers, to learn the trade of a Boilermaker.
Carriage Shop	Two boys, to learn the trade of a Sawyer.
Carriage Shop	One boy, to learn the trade of a Carriage Fitter.
Carriage Shop	Two boys, to learn the trade of a Coach Builder.
Carriage Shop	Two boys, to learn the trade of a Coach Painter.
Blacksmith Shop	One boy, to work steam hammer;

and applications from youths between the ages of 14 and 16 are invited for filling the vacancies.

Applicants must have passed the 5th Standard, and will be required to produce a certificate to that effect, and also certificates as to character.

Applicants who are able to produce proofs of having satisfactorily passed a higher standard of education will receive the preference in filling the vacancies, other things being equal.

The rate of pay to commence with will be 2d. per hour.

Applications should be sent to the Chief Locomotive Superintendent or Locomotive Superintendent, Salt River, from whom any further particulars can be obtained.

Office of the General Manager of Railways, Cape Town,
8th March, 1902.

T. R. PRICE,
General Manager.

Farmers' Apprentices. Dairy Assistants, &c.

As inquiries are from time to time received from young men from abroad as to where they may serve apprenticeship or gain practical experience of farming in this Colony, before starting on their own account, the Secretary for Agriculture invites Farmers who are willing to receive young men of good character, for this purpose, to register their names with the Under Secretary for Agriculture, stating the class of farming they do, how many young men they are prepared to take, and for what period they would enter into an agreement.

It is not probable that these young men will be in a position to give more than their free services in return for the experience they will gain; that is, they will not be able to pay any fee; and they will look to receiving free board and lodging in return for their services.

It is to Farmers, therefore, who are willing to grant such young men free board and lodging in return for services rendered, that this application is especially addressed.

With reference to the above notice to Farmers, the Secretary for Agriculture now invites young men who are willing to engage themselves as Farmers' Apprentices in Cape Colony to register their names with the Under Secretary for Agriculture, Cape Town. The apprentice will gain experience in farming in South Africa, and have an opportunity for spying out the land before starting on his own farm. To the new comer from another country this is essential, for he has much to learn and unlearn.

Many applications for such Apprentices have been received from Farmers in the Colony. It will be noted that the Apprentice will neither receive wages, nor pay a fee. He will get free board and lodging in return for his services, and at the same time acquire the experience he is in need of.

Applications for employment have also been received from several Lady Dairy Experts and Dairy Assistants; and Dairy Farmers and others desiring to avail themselves of the services of such are invited to register their names with this Department, giving particulars as to situation and extent of operations, etc., and salary and other emoluments they are prepared to offer.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM BASUTOLAND.

By command of His Excellency the Governor, the following Proclamation No. 164, 1901, was published in the Government Gazette of October 29th, 1901:—

Whereas by Proclamation No. 100, bearing date the 4th day of June, 1901, I did by reason of the existence of the disease amongst cattle known as Rinderpest in the Territory of Basutoland, prohibit the introduction of horned cattle from the said Territory into this Colony:

And whereas the said disease has spread to the portions of this Colony which adjoin the said Territory, thus rendering it unnecessary to longer maintain the prohibition imposed by the said Proclamation:

Now, therefore, under and by virtue of the powers and authorities in me vested, I do hereby proclaim, declare and make known that from and after the date hereof the prohibition upon the introduction of horned cattle from Basutoland into this Colony shall be removed: the said Proclamation No. 100 of 1901 being hereby repealed accordingly.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM ORANGE RIVER COLONY AND THE TRANSVAAL.

By command of His Excellency the Governor, the following Proclamation No. 139 1901, was published in the Government Gazette of August 16th, 1901:—

Under and by virtue of the powers vested in me by the "Animal Diseases Act," No. 27 of 1893, and by the "Animals Diseases Rinderpest Amendment Act," No. 2 of 1897, I do hereby proclaim, declare and make known that it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced into any part of this Colony from the Orange River Colony and the Transvaal, save and except such cattle as may be required to be introduced by the Government for the purpose of supplying Bile or Serum for inoculation against Rinderpest:

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed

And I do hereby further declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

Proclamation No. 217, bearing date the 29th day of October, 1900, together with the regulations issued thereunder, is thereby repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to ustice any person who may contravene the same.

Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined Regulation for checking the spread of the infection is republished.

REGULATION ISSUED UNDER PROCLAMATION No. 30, DATED 20TH JANUARY, 1899.

Whenever under the provisions of Sections 11 and 12 of Act No. 27 of 1893, any area is declared or proclaimed to be an area infected with Rinderpest, it shall not be lawful for any person, animal, animal produce, article or thing, who or which may, in the opinion of the Magistrate of the District in which such area is situated, be liable to convey infection of Rinderpest, to leave or to be removed therefrom.

Inoculation Against Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of the Colony, it is desirable to inform stock-owners of the intentions of the Government as to dealing with the outbreak should it unfortunately become general in the Colony, and to advise stock-owners as to the best course to follow.

The Government propose that, as a general rule, cattle-owners themselves should perform the inoculation. Glycerinated Bile will be used, though circumstances may arise where it will be preferable to use Serum.

Bile Stations will be established in suitable places as necessity arises in localities where farmers have agreed to contribute the required proportion, say 5 per cent., of their cattle for production of the bile. It must be clearly understood that unless farmers are prepared to thus contribute the necessary cattle, it will be impossible for them to have the benefit of a Bile Station.

Glycerinated Bile will be issued free to contributors in proportion to the number of cattle contributed to a Bile Station. To non-contributors a fair charge will be made for bile if any be available for issue.

Serum will be charged for at the rate of £1 per bottle of ten doses.

A limited supply of Glycerinated Bile to meet emergencies will, for a time, be available, free of charge, from the Bile Station which has been established under arrangements with the Imperial Military authorities near Aliwal North.

As occasion requires, Demonstrators will be sent to instruct farmers in the method of inoculation, free of charge. They will, as a rule, inoculate only enough cattle to show how it is to be done, leaving the owner to continue the work. The Government will supply syringes on application to the Resident Magistrate, or to the Demonstrators at the following charges: 20 cc. capacity, 20s; 10 cc. capacity, 15s. This payment may be recovered on return of the syringe to the Magistrate, in good order.

After the experience gained during the outbreak of 1896-1898, the Colonial Veterinary Surgeon wrote* as follows:—

"The method of inoculation which I would recommend in future sporadic outbreaks of the disease is briefly as follows:—

"*Infected Herds.*—These should be inoculated at once with either serum or glycerinated bile; every animal which indicates infection by a rise of temperature should receive a large dose of not less than 100 cc. of serum, or 30 cc. of glycerinated bile; "the latter should, by preference, be injected into the jugular vein, so as to secure its "immediate action. Then from eight to twelve days after, all the animals in the herd "which give no indication of being infected with the disease, or fever temperature "should receive an injection of pure bile; not less than 10 cc., and for large animals "20 cc. This will confer a lasting immunity sufficient for all practical purposes.

"*Clean Herds.*—When it is decided to inoculate a clean herd, which is in danger of "becoming infected through its proximity to diseased cattle I would recommend that "the animals composing the herd should be inoculated first with 20 cc. of glycerinated "bile, and to follow this inoculation in from eight to twelve days with an injection of

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* See *Agricultural Journal*, June 8, 1899, in which wil be found a full consideration of the different methods of inoculation.

"from 10 to 20 cc. of pure bile. This will confer a strong and lasting immunity on the
" animals in the herd, and will be free from risk arising from the inoculation or of
" introducing the disease.

" *Use of Pure Bile.*—Pure fresh bile should not be used in an infected herd, if any
" of the other inoculating materials can be obtained, as it tends to intensify the
" character of the disease in those already infected, and its immunising effect is too
" slowly developed to protect the healthy cattle against infection, if they are left in
" contact with those already sick. If no other means are available, however, the
" temperatures of the whole of the cattle in the infected herd should be carefully taken
" by the clinical thermometer, and only those which register a normal temperature
" should be inoculated with pure bile, the others should be separated from the inoculated
" lot at once, and carefully tended. If glycerine can be obtained, the spare bile should
" be mixed with it in the proper proportions—one part of glycerine to two parts of
" bile. This mixture, after standing forty-eight hours, may be injected into the affected
" animals in large doses, not only with safety, but with marked benefit.

"*Preparing the Bile.*—The bile should be taken from an affected animal immedi-
" ately after death, or from one which is killed in the last stage of collapse.

" Biles of all shades of colour—except those which are red from the presence of
" blood—may be used, so long as they are clear and free from a putrid smell. Thin
" light yellow biles should also be rejected.

" All the galls extracted at one time should be mixed together, after standing sepa-
" rately for twelve to eighteen hours, so as to render them uniform in strength and
" immunising properties. Pure bile should be used on the second day after being
" drawn, unless it is kept in an ice chest, when it may be kept sweet much longer. But
" if pure bile is used as a second inoculation only, as above directed, it is not desirable
" to keep it longer than twenty-four hours.

" Glycerinated bile is made by adding one part of glycerine to two parts of bile, stir
" the mixture well, then mix all the biles taken at one time, and allow them to stand
" for eight days. But if there is urgency, the glycerinated bile may be used forty-eight
" hours after it is mixed.

"I would strongly recommend that in every outbreak of the disease that occurs,
" every drop of suitable bile, obtained from the animals which die, should be mixed
" with glycerine in proper proportions, two parts of the bile to one of glycerine, so that
" it may be preserved and made available for the inoculation of infected herds, and also
" for the first inoculation of clean herds which may be considered in danger. Pure
" bile for the second inoculation of clean herds can always be obtained when the
" disease appears in any locality, which would be the only reason for inoculating clean
" herds in the immediate vicinity."

Taking the Bile.—To remove the bile the animal must be laid on its left side, the skin and flesh on the right side immediately behind the last rib being cut through; the ribs being raised, the gall bladder will become visible. The gall bladder should be then punctured with a small knife and the gall allowed to escape into a wide-mouthed bottle. If wide-mouthed bottles are not available then ordinary whisky bottles may be used with an *enamelled* funnel, which can be procured at any country store. Every precaution must be taken that the operation is performed in a thoroughly clean manner, the hands of the operator and all knives, &c., being thoroughly cleansed before use.

Inoculating.—After having secured the animal to be operated upon, the necessary dose of bile is injected under the skin of the dewlap by means of a Hypodermic Syringe, care being taken that the point of the needle is not inserted into the flesh, but between the skin and flesh.

Symptoms of Rinderpest.

The Outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined description of the symptoms of Rinderpest is hereby published:—

The early symptoms of Rinderpest are a rise of internal temperature to 106 or 107° Fahr.; the animal stands with its head hanging down, ears drawn back and coat staring; it refuses all food and occasionally shivers. A mucous discharge flows from the eyes and nostrils; the extremities are cold, and the breathing is laboured and frequently accompanied with moaning. The inner part of the upper lip and roof of the mouth and all visible mucous membranes are reddened, and covered with an eruption of minute pimples, and later with a branlike exudation. The bowels are

occasionally constipated, but in most cases diarrhœa sets in, the evacuations being slimy and very frequently of a dirty yellow colour. The prostration of strength is great, the animal staggering when made to move. In milch cows the secretion of milk is rapidly diminished, and soon ceases altogether. The disease usually ends fatally in from six to ten days.

It is generally believed that the infection is produced through the respiratory organs; from there the contagion becomes generalised. The contagion exists in the secretions and excretions, urine, saliva, mucous secretions of the nose, mouth and eyes, in the sweat, expired air, blood, and in all the tissues. It may be conveyed directly by the diseased animals, or indirectly by the dung, the bedding, the earth, hides, wool, meat, clothing, wagons or vessels, by people, dogs, sheep and chickens, &c. Contagion takes place only through short distances. When the weather is dry this is reduced to its minimum (about 27 yards), and the progress of the disease may be stopped by a ditch separating the diseased from the healthy animals.

In order to detect the earliest symptoms of Rinderpest, owners of horned cattle are warned of the urgent necessity for keeping a constant and close watch upon their stock. Any suspicious cases should be immediately reported to the nearest Resident Magistrate, Field-cornet or Police Officer, and the sick animal kept separate till an inspection is made. Stock should be carefully examined daily by a responsible person, more particularly for any symptoms resembling those above described.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October, 1900:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(a) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(b) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B' hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung-sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz.:—

Number and general description of Cattle } ....
....
....
Owner's name and address } ....
....
In charge of..
Place to which Cattle are being sent..........................
(Signature).
(Address)..
Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature..
Address)..
Date.....................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a

period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle ....
Owner's name and address ....
In charge of.......................................
Place to which Cattle are being sent..........
(Inspector's signature).
(Address).............
Date....................

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

RAINFALL, MARCH, 1902.

NOTE: n.r. denotes that, up to the date of publication, Returns have *not* been *received* from those Stations.

I. CAPE PENINSULA:	INCHES.
Royal Observatory, (a) 12 inch gauge	0.90
Cape Town, Fire Station	n.r.
Do. South African College	1·70
Do Sea Point (Hall)	1·09
Do Molteno Reservoir	1·48
Do Platteklip	2·11
Do Signal Hill	1·18
Table Mountain, Disa Head	2·99
Do Kasteel's Poort	3·15
Do Waai Kopje	4·01
Do St. Michael's	3·92
Devil's Peak, Block House	n.r.
Do. Nursery Gauge	n.r.
Do. Lower Gauge	n.r.
Rondebosch	1·07
Newlands (Montebello)	n.r.
Bishopscourt	n.r.
Claremont	n.r.
Kenilworth	1·40
Wynberg (St. Mary's)	1·82
Groot Constantia	
Tokai	2·87
Simon's Town (Wood)	2·54
Do. (Gaol)	2·49
Blaauwberg Strand	n.r.
Robben Island	0·71
Strandfontein	n.r.
Camp's Bay	1·00
Mouille Point	n.r.
Fish Hoek	1·62
Cape Point	1·17
Smith's Farm	n.r.
Durbanville	n.r.
II. SOUTH-WEST:	
Eerste River	n.r.
Klapmuts	2·13
Stellenbosch (Gaol)	1·99
Somerset West	1·81
Paarl	1·45
Wellington (Gaol)	2·74
Do. (Huguenot Seminary)	2·48
Delta	n.r.
Tulbagh	5·50
Kluitjes Kraal	n.r.
Houw Hoek	n.r.
Ceres	4·90
Rocklands	n.r.
Caledon	4·56
Worcester (Gaol)	3·40
Do. (Meiring)	3·63
Do. (Station)	3·90

II. SOUTH-WEST—*continued.*	INCHES.
Hex River	4·80
Lady Grey (Div. Robertson)	1·98
Robertson	2·53
Do. (Govt. Plantation)	2·54
Montagu	3·20
De Hoop (Div. Robertson)	n.r.
The Oaks	n.r.
Rawsonville	3·06
Weltevreden (Div. Caledon)	4·21
Danger Point	1·62
De Doorns	3·20
Ceres Road	3·20
Vygebooms River	1·88
III. WEST COAST.	
Port Nolloth	0·18
Do. (Howard)	n.r.
Klipfontein	0·84
Kraaifontein	n.r.
O'okiep	n.r.
Springbokfontein (Gaol)	n.r.
Concordia	n.r.
Garies	n.r.
Kersefontein	0·73
The Towers	0·72
Dassen Island	0·66
Malmesbury	1·06
Piquetberg	3·12
Do. Road	4·15
Clanwilliam (Gaol)	n.r.
Do. (Seydell)	0·86
Welbedacht	n.r
Hopefield	0·95
Lilyfontein	n.r.
Wupperthal	1·34
Zoutpan	0·92
Anenous	n.r.
IV. SOUTH COAST:	
Cape L'Agulhas	2·03
Bredasdorp	1·60
Swellendam	6·15
Heidelberg	2·65
Riversdale	2·32
Zuurbraak	5·46
Dumbie Dykes	4·17
Mossel Bay	3·95
George	6·09
Ezelzagt	n.r.
Millwood	8·24
Sour Flats	7·90
Concordia	8·38
Knysna	6·03
Buffels Nek	11·04

III. SOUTH COAST—*continued.*	INCHES.
Harkerville	n.r.
Plettenberg Bay	6·12
Forest Hall	6 74
Blaauwkrantz	7·84
Storm's River	10 18
Witte Els Bosch	9 83
Humansdorp	4 54
Cape St. Francis	10·11
Hankey	5·70
Witteklip	7·09
Van Staaden's (upper)	5·46
Do. (lower)	5·40
Uitenhage	3·33
Do. (Inggs)	n.r.
Do. (Park)	3 44
Dunbrody	4·93
Port Elizabeth (Harbour)	2 87
Walmer Heights (near Port **Elizabeth)**	4·83
Tankatara	2 79
Lottering	8 46
Shark's River (Nursery)	3 02
Do (Convict Station)	3 44
Grootvader's Bosch	7 25
Karnmelks River	2 24
Armadale	8·86
Vogel Vlei	3 33
Victoria Park, P.E.	3·08
Great Brak River	5 02
Melkhoutfontein	4·05
Centlivres	3·90
Kruis River (Uitenhage)	3 64
V. SOUTHERN KARROO:	
Touws River (D.E.'s Office)	2·39
Ladismith	4·19
Amalienstein	3 20
Calitzdorp	1·95
Oudtshoorn	3 90
Vlakte Plaats	n.r.
Uniondale	3·76
Kleinpoort	n.r.
Glenconnor	4·43
Triangle	0 91
Grootfontein	0 58
Pietermeintjes	1·40
Bok River	0 88
Verkeerde Vlei	1·66
Seven Weeks Poort	3 85
VI. WEST CENTRAL KARROO:	
Matjesfontein	2·30
Prince Albert Road	1 93
Fraserburg Road	n.r.
Prince Albert	2·26
Zwartberg Pass	5 81
Beaufort West	2·80
Dunedin	n.r.
Nel's Poort	0·95
Camfer's Kraal	1·01
Lower Nel's Poort	0 86
Baaken's Rug	1 05
Willowmore	5·09
Steytlerville	4 88
Rooiplaats	2·22
Laingsberg	1·25

VII. EAST CENTRAL KARROO:	INCHES
Aberdeen (Gaol)	1·88
Do. (Bedford)	2 41
Aberdeen Road	1·76
Rietfontein	2·55
Winterhoek	n.r.
Klipdrift (De Erf)	2·01
Kendrew	1·75
Graaff-Reinet	3 08
Do. (College)	2·66
Do. (Engineer's Yard)	2·53
New Bethesda	1·52
Roode Bloem	1·49
Wellwood	n.r.
Do. Mountain	n r.
Jansenville	2.92
Patrysfontein	n.r.
Toegedacht	1·73
Klipfontein	2·09
Cranemere	3 58
Pearston	3 79
Walsingham	6 13
Somerset East	4·00
Do. (College)	3·88
Longhope	n.r.
Middleton	n.r.
Corndale (Div. Aberdeen)	n.r.
Cookhouse	n.r.
Doornbosch, Zwagershoek	n r.
Middelwater	2·92
Darlington	n r.
Bloemhof	1·71
Arundale	4 20
Glen Harry	1 77
Roode Hoogte	n.r.
VIII. NORTHERN KARROO.	
Calvinia	n.r.
Middlepost	n.r.
Sutherland	1·10
Rheboksfontein	n.r.
Fraserburg	n r.
Onderste Doorns	n.r.
Droogefontein	n.r.
Gannapan	n.r.
Carnarvon	3·24
Wagenaar's Kraal	1·61
Brakfontein	n.r.
Vogelstruisfontein	n.r.
Victoria West	1·71
Britstown	2·46
Murraysburg	n.r.
De Kruis	n.r.
Richmond	n.r.
De Aar	2 63
Middlemount	n.r.
Hanover	3·70
Philip's Town	2·01
Boschfontein	2·31
Petrusville	0 93
The Willows	n.r.
Naauwpoort	n.r.
Middelburg	1 31
Colesberg	2·51
Tafelberg Hall	n.r.
Rietbult (Colesberg Bridge)	1·69

VIII. N. KARROO—*continued.*	INCHES.
Stonehills	2·97
Cradock	1·83
Do. (Rose)	2·03
Varsch Vlei	n.r.
Witmoss	n.r.
Steynsburg	3·17
Do. (**Nesemann**)	3·17
Daggaboer's Nek	1·85
Quagga's Kerk	n.r.
Tarkastad	2·03
Drummond Park	2·72
Riet Vlei	1·82
Williston	
Omdraai's Vlei	
Zwagersfontein	2·69
Varken's Kop	1·63
Culmstock	1 24
Doorskuilen	n.r.
Houwater **Dam**	n.r.
Hillmoor	2 75
Glen Roy	2·44
Fish River	n.r.
Spitzkop	2 26
Phizantefontein	n r.
Biesjesdam	n.r.
Kleinhaasfontein	1·73
Spring Valley	n.r.
Beyersfontein	1·46
Zeekoegat	0·27
Haasfontein	2·43
Maraisburg	n.r.
Scorpions Drift	1·73
Wagenaars Kraal	1 61

IX. NORTHERN BORDER:	
Pella	n.r.
Kenhardt	n r.
Van Wyk's Vlei	n.r.
Prieska	n.r.
Dunmurry	n r.
Griqua Town	n.r.
Campbell	3·38
Douglas	2·92
Avoca (Herbert)	3 58
Eskdale	1·54
Hopetown	4·46
Orange River	n.r.
Newlands (Div. **Barkly West**)	2·12
Groot Boetsap	n.r.
Kimberley (Gaol)	1·40
Do. (**Stephens**)	2·05
Bellsbank (Div. **Barkly** West)	n.r.
Barkly West	1·99
Upington	n.r.
Trooilapspan	n.r.
Rutland	1·54
The Halt	n.r.
Karree Kloof	n.r.
New Year's Kraal	1·26

X. SOUTH-EAST:	
Fairholt	2·73
Cheviot Fells (Bedford)	n.r.

X. SOUTH EAST—*continued.*	INCHES.
Alicedale	n.r.
Bedford (Gaol)	3·61
Do. (Hall)	n.r.
Sydney's Hope	4·31
Cullendale	n.r.
Adelaide	3.46
Atherstone	3·98
Alexandria	3·81
Salem	2·66
Graham's Town (Gaol)	3 92
Do. (**Bact.Inst.**)	3·70
Heatherton Towers (near **Graham's Town**)	n.r.
Fort Beaufort	3·83
Katberg	4·22
Do. (Sanatorium)	3·63
Balfour	n r.
Seymour	2·38
Glencairn	5·17
Alice	4·57
Lovedale	n.r.
Port Alfred	1·08
Hogsback	3·43
Thaba N'doda	3·21
Peddie	3·10
Cathcart	3·97
Keiskama Hoek	5·13
Thomas River	4 83
King William's Town	2·06
Do. Hospital	n.r.
Stutterheim (Wylde)	5·34
Do. (Besté)	4·51
Dohne	3·62
Lynedoch	3 77
Kubusie	2·06
Blaney	n.r.
Kei Road	2·94
Evelyn Valley	7·20
Berlin	3·19
Isidenge	3·68
Perie Forest	3·29
Quacu Forest	5·11
Ko'ogha	6·55
Fort Jackson	2·35
Komgha	2·95
Prospect Farm (Div. Komgha)	n.r.
East London, West	1·73
Do. East	1·72
Fountain Head	n.r.
Fort Cunynghame	3·27
Crawley	3·65
Bolo	n.r.
Fort Fordyce	3·51
Exwell Park, Waku	4·89
Melrose	2·13
Sunnyside	3·98
Chiselhurst	1·61
Sterkspruit	5·81
Scott's Bottom	1·77
Dontsah	4·09
Wolfridge	4·20
Cata	3·66
Forestbourne	5·21

XI. NORTH-EAST:	INCHES.
Venterstad	4·69
Ellesmere	4·42
Burnley, Cyphergat	n.r.
Burghersdorp	5·08
Do. (Le Roex)	n.r.
Molteno Station	n.r.
Cyphergat	1·91
Thibet Park	2·39
Sterkstroom	n.r.
Do. (Veitch)	n.r.
Rocklands	2·72
Aliwal North (Gaol)	4·98
Do. **(Brown)**	4·96
Rietfontein	3·94
Buffelsfontein	n.r.
Hex's Plantation	3·49
Carnarvon Farm	1·18
Jamestown	2·31
Queenstown (Gaol)	1·89
Do. (Beswick)	2·36
Dordrecht	n.r.
Tylden	4·45
Snow Hill	n.r.
Herschel	7·50
Lady Grey	n.r.
Bolotwa (Contest)	n.r.
Lady Frere	1·91
Avoca (Div. Barkly East)	n.r.
Keilands	3·10
Barkly East	n.r.
Glenlyon	n.r.
Gateshead	n.r.
Lyndene	4·29
Mooifontein	3·80
Poplar Grove	2·26
Biesjesfontein	n.r.
Whittlesea	2·45
Blikana	3·46
Doornkop	2·83
Halseton	1·04
Middlecourt	1·67

XII. KAFFRARIA:	
Slaate, Xalanga	n.r.
Ida, Xalanga	n.r.
Cala, Xalanga	n.r.
Cofimvaba	n.r.
Nqamakwe	4·75
Main	n.r.
Engcobo	n.r.
Butterworth	2·41
Kentani	1·77
Maclear	n.r.
Idutywa	1·89
Willowvale	1·46
Mount Fletcher	2·30

XII. KAFFRARIA—*continued*	INCHES.
Elliotdale	1·44
Mqanduli	n.r.
Matatiele	n.r.
Umtata	3·49
Qumbu	n.r.
Kokstad	3·82
Port St. John's	n.r.
Umzimkulu	2·62
Woodcliff	3·75
Tabankulu	2·60
Kilrush	4·87
Somerville (Div. Tsolo)	2·43
Tsomo	2·54
Seteba	3·16
Flagstaff	4·81
Qucbe	3·53
Insikeni	3·44
Bazeya	3·83

XIII. BASUTOLAND:	
Mafeteng	
Mohalie's Hoek	4·36
Qacha's Nek	3·59
Moyeni Quthing	6·13
Teyateyaneng	9·61
Leribe	n.r.
Butha Buthe	n.r.
Maseru	n.r.

XIV. ORANGE RIVER COLONY:	
Bethulie	3·71
Kroonstad	3·64

XV. NATAL:	
Durban, Observatory	10·23

XVI. TRANSVAAL:	
Johannesburg	n.r.
Do. Cemetery	n.r.

XVII. BECHUANALAND:	
Vryburg	2·35
Taungs	2·45

XVIII. RHODESIA:	
Salisbury	7·78
Hope Fountain	3·64
Geelong	1·47
Chishawasha	17·37
Figtree Siding	n.r.

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, 3rd May, 1902, as telegraphed by the Civil Commissioners of the places respectively named, and from Natal, is published hereunder.

CENTRE.	A. Wheat per 100 lb.	B. Wheat Flour per 100 lb.	C. Boer Meal per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal per 100 lb.	F. Barley per 100 lb.	G. Oats per 100 lb.	H. Oat-hay per 100 lb.	J. Potatoes per bag	K. Tobacco (Boer Roll) per lb.	L. Beef per lb	M. Mutton per lb	N. Fresh Butter per lb	O. Eggs per doz.	P. Cattle Slaughter	Q. Sheep (Slaughter)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s d.	£ s. d.	£ s. d.	£ s d.	£ s. d.	£ s d.	£ s d.	£ s d	£ s. d	£ s d.	£ s d	£ s. d.
Allwal North ...	...	...	..	...	...	...	...	.	...	.		..		...	...	...
Beaufort West ..	0 13 0	0 19 0	0 15 0	0 15 0	...	0 10 0	0 19 0	0 16 0	0 12 6	0 2 0	0 0 8	0 0	0 2 0	0 2 6	...	20/- to 22/6
Burghersdorp ...	0 9 6	...	0 12 6	0 10 0	...	0 8 6	...	...	0 8 0	0 1 9	0 0 8	0 0 7½	0 1 0	0 3 0	...	...
Cape Town ...	0 10 0	0 12 6	0 11 0	0 9 0	0 9 6	0 8 0	0 10 0	0 9 0	1 0 0	0 0 6	0 0 7	0 0 8½	0 1 3	0 2 9	17 0 0	1 0
Clanwilliam ..	...	...	...	...	...	...	...	...	...	0 1 0	0 0 8	0 0 7	.	0 1 6	£6 to £12	10 to 20
Colesberg ...	0 8 6	...	...	0 8 0	...	0 7 6	...	..	0 10 0	...	...	...	0 1	0 2 9	...	...
Cradock ..	...	..	...	...	...	...	...	...	0 10 0	...	0 0 8	0 0 8	0 1 2	0 3 3	...	...
Dordrecht ...	...	...	...	...	...	...	...	..	...	..	...	...		...	...	...
East London ...	0 11 6	0 17 3	0 11 6	0 11 9	0 10 0	0 15 9	0 18 3	0 12 6	0 17 6	0 1 6	0 1 0	0 1 0	0 2 9	0 3 10	..	...
Graaff-Reinet ...	0 11 6	...	0 13 7½	0 11 9	...	0 11 9	0 11 9	..	0 15 0	0 0 7½	0 0 7	0 0 7	0 1 4½	0 2 0	£11 to £14	20/- to 22/6
Graham's Town ...	0 10 6	...	..	0 12 9	...	0 5 6	—	0 12 6	...	0 1 2	0 0 8½	0 0 9½	0 1 6	0 3 7½	...	...
Kimberley ...	0 13 0	0 17 0	0 14 0	0 13 0	0 12 0	0 12 6	0 12 0	0 14 0	1 4 0	0 1 0	0 1 2	0 0 10	0 2 3	0 3 6	£12 to £18	20/- to 24/-
King Wm's Town	0 9 9	0 16 0	0 13 0	0 10 0	0 10 3	0 12 9	0 12 6	0 7 6	0 13 6	0 1 0	0 0 8	0 0 9	0 1 6	0 2 9	£25	17/6 to 23/6
Malmesbury ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

CENTRE.	A. Wheat per 100 lb.	B. Wheat Flour per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal. per 100 lb.	F. Barley per 100 lb.	G. Oats per 100 lb.	H. Oat-hay per 100 lb.	J Potatoes per bag	K. Tobacco (Boer Roll.) per lb.	L. Beef per lb.	M Mutton per lb.	N. Fresh Butter per lb.	O Eggs per doz.	P Cattle, Slaughter.	Q. Sheep, Slaughter
	£ s. d.	£ s. d.	£ s. d	£ s d.	£ s. d.	£ s d	£ s d.	£ s d	£ s. d.	£ s. d	£ s d	£ s. d.	£ s. d	£ s. d.	£ s d.	£ s. d
Mossel Bay ...	0 12 0	0 16 6	0 12 0	0 9 0	...	0 6 0	0 15 0	0 7 6	0 16 0	0 1 0	0 0 9	0 0 9	0 1 6	0 2 0	...	...
Pietermaritzburg Natal	..	...	...	0 6 0	0 6 9	...	..	...	0 7 0	0 1 0	0 0 10	0 0 10	...	0 3 6	25 0 0	1 5 0
Port Alfred	...	...	...	0 15 6	...	...	...	...	0 12 0	...	...	...	0 1 3	0 2 6	...	..
Port Elizabeth ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	..
Queen's Town ...	0 11 0	0 16 9	0 10 6	0 10 0	0 6 0	0 8 0	0 7 6	0 7 6	0 10 0	0 2 6	0 0 8	0 0 7	0 1 9	0 2 6	...	...
Tarkastad ...	..	...	...	...	.	...	...	...	.	...	.	...	...	...	...	...
Vryburg ...	0 16 0	1 1 0	0 17 6	0 12 6	0 5 0	...	0 15 0	1 1 0	1 6 0	0 1 6	0 0 10	0 0 10	0 3 6	0 4 0	...	...
Worcester ..	0 11 0	0 14 6	1 2 0	0 10 0	0 11 0	0 8 0	0 12 0	0 8 0	0 16 0	0 1 0	0 0 8	0 0 8	0 1 9	0 2 0	12 0 0	1 4 0

NOTE.—Returns have not been received from the Civil Commissioners of Aliwal North, Dordrecht, Malmesbury, Port Elizabeth and Tarkastad.

THE

Agricultural Journal.

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EDITORIAL NOTES.

Respecting our first note in last issue on Zout Bosch, we may say that the seed has not yet been delivered to the Department, but will be in all probability very shortly, when the official notice on the subject will be issued.

With reference to communications entered into with the Natal Government by this Department, relative to the importation of cattle from Madagascar, we learn that large numbers of Madagascar oxen have recently been imported into Natal, where they arrived free from disease with the exception of tuberculosis. They do not appear to require acclimatising, and it is understood that the Coast belt suits them best. The approximate cost of these oxen, landed in

Natal, is £6 10s. per head on a shipment of 900, and the fodder is purchased in Natal and sent to Madagascar for use on the return voyage.

The Government has received information from the British Consul at Buenos Ayres, that the Argentine Republic, with the object of fomenting trade with this Colony, has placed the Government transport *Pampa* on the berth to load general cargo for Cape Town. This step, it is reported, has been taken in consequence of representations made by Señor Storni, the Argentine Consul at Cape Town.

The following are the rates of freight quoted for this vessel:—

Wheat or Maize, twenty shillings per ton.
Oats or Barley, thirty „ „ „
Bran, thirty-five „ „ „
Hay, fifteen shillings per forty cubic feet.

The idea seems to be approved of by Argentine exporters, for all the space on the *Pampa* has already been taken up, and it is proposed to send to Cape Town another transport, the *Chaco*. In this vessel will be sent specimens of prize winners at the Agricultural Society's Show to be held here on the 1st proximo.

On page 633 will be found a valuable contribution from the Colonial Veterinary Surgeon on Heartwater in Sheep and Goats. By referring to previous reports that have appeared from time to time in this journal, readers will be able to judge how far the investigations conducted by Veterinary Surgeons Dixon and Spreull have progressed. At present, as pointed out in Dr. Hutcheon's last paragraph, the point for future consideration in the test inoculations, is, what fever reaction will be sufficient to withstand veld infection, and to this Mr. Spreull is now directing his attention.

We hear very favourable accounts of tobacco grown at Poplar Grove, in the Queenstown District, by Mr. C. W. Leach. As a tobacco-grower in the Rustenburg district of the Transvaal, Mr. Leach has had considerable experience, and the samples raised by him enjoy popularity in the Eastern Province. He has close on 400 acres of the farm under tobacco culture, carrying about one million plants. There are thirty-three different varieties of the soothing weed under cultivation, and twenty white men and 200 native labourers are employed. The tobacco is prepared in various qualities, and "No. 1" is said to equal the finest Transvaal, while the Colonial "Latakia" is free from the pungent odour of many Transvaal mixtures. Considering that Mr. Leach has expended over £10,000 during the last three years on the industry, we wish him every success in his deserving enterprise.

The Dordrecht paper reports that some native boys, while digging for clay at the local brick-works, recently, struck a seam of coal six feet from the surface. Some of it was dug out and ignited with splendid results. If the discovery proves of any thickness and continuity, it should turn out to be a lucky find.

In view of the rapidly diminishing big game of South Africa, sportsmen and others interested in the subject will be pleased to find that a proclamation amending the game laws has been promulgated in the Orange River Colony. In future, no person will be allowed to kill game unless provided with a game licence, which will cost £3 for the season, or a third of that amount for two weeks. Wildebeeste, blesbuck, rhebuck, duiker and steenbuck are absolutely protected for one year. Half the licence monies, &c., received under the proclamation will be paid over to the Orange River Colony Game Protection Society. It is also enacted that for every greyhound or bastard greyhound a tax of £5 shall be paid.

Further, it has been proposed to establish regulations for the purpose of preserving the more valuable game in the Transvaal, which are threatened with extinction.

It is suggested that camps should be formed on all the experimental farms in connection with the Agricultural Department, such camps to be set apart for the purpose of breeding certain species of game, in order that the country may be restocked. The Zoological Society of the Transvaal is anxious to induce the Administration to take immediate active steps and have the Sabi Reserve proclaimed and well guarded. It is expected that Rhodesia, Orange River Colony, Bechuanaland, Cape Colony and Natal will co-operate in furthering this work, without which the interesting fauna of South Africa will soon be gone for ever.

As far as the Cape Colony is concerned, she took the lead years ago in framing regulations for the preservation of game and proclaiming close seasons. Elephants and buffalo, for instance, are carefully protected from slaughter, and only under exceptional circumstances can a permit be obtained for shooting either.

In this issue the Government Entomologist, Mr. C. P. Lounsbury, contributes a very interesting memorandum on the longevity of a certain species of tick, prevalent in the British Isles, which is suspected of being connected with the disease called "louping ill" and transmitting it to animals, the same as our Blue Tick transmits redwater, the Bont Tick, heartwater, and the Dog Tick, malignant jaundice.

QUERIES AND REPLIES.

Lecanium Scale on Peach

I forward you a piece of peach cutting taken from a garden in this district. I may state that the disease first started on an orange tree and has now extended to every fruit tree in the garden. Hollyhocks and dahlias are also infested with it. Will you kindly make the disease known and any remedy for the same. I may also state that all sorts of sheep dip and sulphur have been tried without any effect.

W. C. Maytham.

The "disease" is a heavy infestation of a soft scale insect of the genus *Lecanium* accompanied by the common soot fungus. Were it not for the insect the fungus would not be present, as it gets its nourishment from the sweet and sticky excretion known as honey-dew that comes from soft scales and many similar tree pests.

Soft scale insects are generally held in check by internal parasites and predatory insects in this Colony, and they also suffer heavily from the inroads of a small caterpillar that hides beneath a covering often mistaken for a gigantic scale insect by farmers; but no trace of any natural enemy is noticeable on the twig received. Fumigation of the infested plants with hydrocyanic acid gas is the most efficacious of the artificial remedies that may be used, and this treatment is used for the Red Scale on orange trees by some farmers in the correspondent's vicinity; he may be able to hire the necessary apparatus without great expense. Spraying for soft scales is more satisfactory than spraying for the hard shelled sorts like the Red Scale. Resin wash is the most approved insecticide for the purpose, and soft soap at the strength of a pound to two and a half gallons of water makes a fair substitute; inferior to these washes but still valuable is an emulsion of paraffine oil and water. Directions for preparing resin wash and the emulsion are given on the Spray Calendar issued by the Department.

The insects on the twig were crushed beyond easy recognition when received, the twig having been enclosed in the envelope with the letter. Specimens in better condition are much desired that the exact identity of this seemingly pernicious species may be determined. It is very much like the common soft or brown scale of the orange in appearance (*Lecanium hesperidum*), but this latter species does not appear to be recorded on peach, and there seem to be some structural differences between the two. The Department should be informed from time to time of the progress of the pest. If it is destructive next year it may be worth while to attempt the colonization on parasites that may take to it.

Chas. P. Lounsbury.

Kaffir Corn as Ensilage.

Could any of your readers inform me if they have tried Kaffir corn alone as ensilage, and with what results?

S. A. Mortimer.

Kaffir corn alone is frequently used as ensilage. Of course, it must be stacked in a green condition. The results are usually good.

Rams for Importation.

Being about to visit Europe I have been approached by several of my friends with regard to importing some good rams. Under these circumstances I should be glad to have your opinion as to what breed you consider most suitable for the country. Do you think there will be a demand for imported rams should Martial Law be abolished?

W. Easby.

The Lincoln and the Shropshire are the most popular breeds of sheep for crossing with our Merinoes. The former in our best grass veld, the latter in the Karoo and mixed veld. I think it is probable that some imported rams will be required to increase the size of our sheep as the price of mutton has increased so much.

D. Hutcheon.

A short time since Mr. T. J. Ferreira, who headed his letter "Naauw Poort," wrote to us for information about the growth of lucerne. We sent him the necessary information, and a few days ago our letter and enclosure were returned through the D.L.O. Will Mr. Ferreira please write again with full address?

Editor.

Telegony, or Maternal Infection by the First Sire.

I have a good Persian ram which I put to 100 good Merino ewes after they had lambed from a thoroughbred Merino ram. The ewes have now lambed cross Persian. I wish to cover the same 100 ewes with the Merino rams. Will there be any strain of the [illegible] the lambs when the ewes lamb?

H. J. Theron.

The question asked by Mr. Theron would, a few years ago, have received an answer in the affirmative, but a series of systematic experiments conducted during the last seven years by Prof. J. Cossar Ewart of Edinburgh University,* at his farm Penycuik, appear to prove that there is no foundation for the almost universal belief of the influence of a first sire on the future progeny of the dam. The theory of maternal infection was expressed somewhat as follows:—"When a pure-bred female of any particular breed has been pregnant to a male of a different breed, more especially if it were her first pregnancy, that female is a cross ever after, the purity of her blood being lost in consequence of her fruitful connection with the foreign male. Different explanations were given as to the cause of this supposed fact, but the one most generally accepted was that the blood of the dam becomes inoculated with the distinctive character and peculiarities of the sire, through the medium of the fœtus, during its development and growth in the uterus. The fœtus, as will be readily understood, partakes of the character and peculiarities of the sire as well as of the dam, and when the sire is of a different breed from the dam, in the proportion that the fœtus partakes of the nature and physical peculiarities of the sire will the blood of the dam become inoculated or contaminated, and she will remain a cross for long, if not for ever afterwards, and in consequence, incapable of producing pure-bred offspring to a pure-bred sire of her own breed." Darwin, who accepted the theory, gave a different explanation of the cause. He says: "The analogy of the direct action of the foreign pollen on the ovarium and seed coats of the mother plant strongly support the belief that the male element acts directly on the reproductive organs of the female, wonderful as is this action, and not through the intervention of the crossed embryo."†

In discussing this question, "Some Results of Cross Breeding," Prof. Cossar Ewart says:—"Many take for granted that in their characters offspring are intermediate between their parents, while others, following Mr. Galton, assume that the offspring take about equally after their immediate and remote ancestors, the further removed ancestors counting the least. Since Darwin recognised that the crossing of distinct breeds led, or appeared to lead, to reversion or atavism, *i.e.*, to the re-appearance in the offspring of ancestral traits, it has been assumed by many that intercrossing is invariably accompanied by reversion or atavism; while others have sought to maintain that there is no such thing as reversion. I find, as the result of many experiments, that in animals as in plants, the offspring can rarely be said to be intermediate between their parents or to unite in equal proportions the characters of their intermediate and less immediate ancestors, and further, that the crossing of perfectly distinct strains, varieties, or breeds, is not necessarily followed by reversion. The offspring, or some of them, may (1) down to the smallest details resemble one of the parents—sometimes the male, sometimes the female; or (2) they may reproduce both the mental and physical peculiarities of one of the grandparents, or of even a fairly remote ancestor; or (3) they may consist of an equal mixture of two or more breeds, and well deserve to be designated mongrels; or (4) they may combine the more striking characters of two breeds; or (5) they may present quite new characters; when this happens they are often termed 'sports.'"

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* The Penycuik Experiments. By J. C. Ewart. London; A. & C. Black.

† Darwin's Plants and Animals under Domestication.

The Professor then proceeds to give a number of examples in illustration of these several points, as a result of crossing the different breeds of dogs and horses, the crossing of horses with the several varieties of the ass and the zebra, and numerous other animals, including birds. With respect to mules and hinnies, he says: "I see no evidence of reversion either to the ancestors of the horse or ass; like hybrids between pheasants and fowls, they are more of the nature of mongrels, probably because their parents are very remotely related." Further on he says: "That there is a want of uniformity in hybrids will not appear wonderful if it is borne in mind that the offspring of even inbred members of the same variety or strain vary; that now and again the parents lose control of the development, with the result that a somewhat remote ancestor is reproduced. Pronounced cross-breeding never seems to favour the formation of sports, but it very frequently, as Darwin recognised, results in reversion, seldom, however, to exactly the same amount in any two cases."

Coming to his own inquiries the Professor says:—"Neither in the case of horses, cattle, sheep, dogs, cats, rabbits, mice, nor guinea-pigs, nor yet in the case of ducks, fowls, or pigeons, have I ever seen a case of telegony. Many remarkable instances of variation and reversion (which some would doubtless have explained by the infection hypothesis) have been observed, but in every instance it was possible to account for the phenomena without resorting to the telegony doctrine."

The Professor is equally strong in his condemnation of the doctrine of the effect of "Mental Impressions," notwithstanding the apparent success which attended the Patriarch Jacob's operations in that direction. The transmission of acquired characters is also dismissed as being unworthy of the consideration of scientific men, "a sufficient explanation of the supposed phenomena being found in variation and selection." Even the belief, so widely entertained by breeders, that some characters are contributed to the offspring by the male, while others are contributed by the female, receives no countenance, and he says: "This assumption is no longer tenable, because we now know that in every cell—every one of the minute protoplasmic bricks—which enters into the construction of a new individual, both parents are represented—the one, as it has been said, forming the warp, the other the woof—*prepotency always* *settling which parent obtains the ascendency in each separate organ or tissue."*

From the foregoing, it will be evident that Mr. Theron may safely re-introduce pure bred merino rams into his flock, without any serious apprehension as to the result.

D. H.

Cattle Bail and Lucerne.

Through the medium of your journal can you inform me:—(1) How to make a simple construction of some sort or other to hold cattle while inoculating them. I believe the Australians have some sort of construction they call (I think) a "Bail." (2) Whether there is only one kind of lucerne plant. I saw two patches in a field the other day, on exactly the same kind of soil, the one growing much more luxuriantly than the other, with larger leaves and looking better in every way. The two patches were sown about the same time but from different lots of seed.

C. H. EVERY.

Middelburg.

In vol. vii. p. 595 you will find an illustration of a yard-crush and cattle bail. D. HUTCHEON.

I only know of one species of lucerne. E. P.

Disc Pulverizer.

In your issue of 10th April, which has only lately come to hand and is the latest received, there is an enquiry by "G" with regard to the advantages of using a Disc Pulverizer on lucerne land and a note from you inviting information. I enclose a cutting from an Australian paper which might be of use.

HENRY VEALE.

Koude River, Elim.

Growers of lucerne in Texas are fully seized of the importance of periodically working their land so as to divide the roots and cause a fresh growth to spring up. The disc harrow appears to be the favourite implement for the purpose. A writer in the *Texas Stock Journal* thus describes the operation:—" A harrow with sharp 16in. discs was used, the discs being set at a slight angle, just sufficient to turn the soil over, and the harrow was weighted to make the discs split the alfalfa crowns to a depth of 2in. The discing split the alfalfa roots, and this made them throw out many new shoots. The discing made an earth mulch over the field and prevented the evaporation of water so rapid in a dry time from an alfalfa field just after being cut. The discs were set so that they barely turned the soil over, and, running at a depth of 2in., they turned the roots of the crab grass and weeds up to the sun, which killed them. These disced fields were clean and free from crab grass in the fall."

Swiss Goats. Wireworms in Poultry.

Referring to my letter of 8th March *re* Imported Swiss Milch Goats, I am happy to say that five of the ewes have kidded (four 2 kids, one 3 kids), which are all doing splendidly so far. They have created a great deal of interest and I had many visitors to inspect them.

I was interested in your notes on Poultry, as for years past I have been keeping a large number of them with satisfactory results. There is one thing I should however be glad to get information about. When W. Cook, the poultry expert, visited this district he pointed out that nearly all the poultry were badly infested with worms, particularly wireworm—is there a cure for these? I find that the powder Cook recommended did not destroy the wireworms. Would it be any use trying sulphate of copper, and in what doses?

W. KONSCHEL.

Uitenhage, May 7th.

One grain of sulphate of copper or two grains of santonine may be given daily for several days. The former in a bread pill and the latter mixed in an egg-spoonful of castor oil.

D.H.

AGRICULTURE.

Well-Sinking.

The life blood of all organic matter is water. Its circulation is so wonderful that if every other evidence of the existence of a wise providence was missing this alone would prove the existence of a wise creator. What an immense factor this water presents is obvious in its vast extension over our earth; of which about three-fourths is covered with this fluid.

The evaporation from the ocean rises up into the air and is driven by the wind all over the earth, where it descends in rain, snow, hail, or dew, dispersing its blessings to the just and the unjust indiscriminately. From the face of the earth it partly evaporates, but not until after having invigorated the vegetable kingdom. Much of it will percolate by the pores of the earth into veins and fissures, forming invisible little rivulets, currents and lakes. Though not visible, their existence can be judged by the surface of the earth as well as by the stratification of sand, clay, rock, shale, gravel, &c. To judge this to a certain degree of exactness is one of the branches of geology, requiring a great deal of study.

Every drop of water evaporated from the ocean will in the lapse of time return there, as there is no such thing as rest in nature. From the grain of sand to the gigantic mountain, everything moves though imperceptible to our senses, immeasurable by our limited knowledge of space and time, they move!

To give some practical hints to find the water veins underneath the surface of the earth is the object of this article.

First, indications can be derived from the surroundings of the place where you want the well. Is there a well in the neighbourhood? How deep to water? What kind of soil is the water in? How thick is the water-holding stratum? Is the well above or below your place? are questions to be considered. Observe the growth of trees and such plants as are growing on the spot. If the trees are of good growth and of such kind as are found in places where water is abundant, the probability of getting water by digging increases. If there are not such signs, and no well in the neighbourhood, boring or drilling for water is the only reliable way. If possible, select a place on the lower side of the hill, or better, of an extensive plane. If you intend to dig for an abundance of surface water, not artesian, get a 2 or 3 inch earth auger and bore down. Set three posts over the place to be tested, with a pulley tied at the apex. Place two posts nearer together for a rough windlass. Place the rope over the pulley before you raise the posts, which are tied together on the ground. Wind up the rope on the windlass; tie the auger with a short piece of gas pipe to it. A swivel joint should be provided so as not to twist the rope; bore down as far as you can, which is done in a few minutes, if the auger is a good one. Join another short piece of gas pipe (inch pipe is sufficient) to it; bore it down and screw a piece of double or triple length of pipe in the place of the second short piece, and keep on alternately with short pipe followed by longer ones, until you strike the water-holding strata. The auger should never be forced into the ground more than three-quarters of its twisted length, else you will lose time in withdrawing it. You can, in the water strata, run the auger down easy, but it will come out empty as the watery stuff will not hang on to the auger. By making a mark on the auger rod and running it down through the water stratum, you can measure the capacity of that stratum, and if you find it over 5 feet there will be an abundance of water; then you may commence digging.

The great mistake in well digging is that they are hardly ever brought down to the bottom of the water strata, and in a droughty season the well goes dry. To avoid this, it is essential to force the curbing down as the digging goes on and cut off the quick-sand as quick as possible. A well that may do very well for household uses and a few head of cattle is insufficient for irrigation. Make three, four, or more frames, according to the depth to go, of red cedar, oak, mulberry, or cypress (or best of all bois d'arc if it can be had) 5 feet long and 3½ wide. Then provide as many good sound boards of oak as will go round those frames, of 6 or 8 inches width, 2 inches thick, and from 16 to 20 feet long. Sharpen the lower points from the inside so that they resemble a chisel; nail brackets 2 feet from the lower end up to the upper end every 3½ or 4 feet, so as to hold the frames from falling down. Set these planks into the well when caving ground appears; adjust the lower frame on the lowest bracket without nailing it, and so the second and third frames, to their respective places; make a light frame outside of the boards to keep them together, and drive with a wooden maul such boards that will not go down by their own weight. Keep on digging until you reach the bed rock or the water-retaining clay-bed. A good pump, with a piece of suction hose, attached and operated by horse or machine power, must be used in case the water is too strong to be overcome by hand power. At all hazards the bottom of the water-holding strata has to be reached. If these boards are tongued and grooved they will slip the better. Should the well be deeper than the length of the boards, they can be driven down with a heavy beam so arranged that it can be used as a pile driven from the top, and so secured that it cannot drop to endanger the men digging below. When the digging and driving are finished and there remains a piece of the dug well to be curbed, on top of the boards, a good plan is to saw pieces of round oak poles. After taking the bark off, for otherwise they will rot in a few years, to the length required, make a frame of them by joining them in the manner of an old-fashioned log house, running bolts through them of about 5 feet length, close to the corners but not in them. The frame is made on top of the well and lowered down on the board curbing. New rods are placed when the first are filled up a little on one side of the first ones screwed on to the upper rounds of the first frame, uniting both frames firmly together. The cross-pieces are provided with holes and slipped over the bars until the bars are fitted up again. Where the soil is not of a serious caving nature the well may be dug down to the water stratum, somewhat larger, and the intended well and the boards brought down as before but only through this stratum.

It is to be admitted that there are a great many different methods to dig a well, but the described one has convinced the Author to be the most expedient with inexperienced labourers, and therefore, more advisable to the farmer.—W. R. WELKE, in the *Farm and Ranch.*

Artesian Waters and Irrigation.

The action of an artesian well depends upon very simple principles. The water accumulates and is conserved in porous rocks lying between two layers of impermeable strata underlying large areas of country. These porous rocks crop out at the surface and form thereby the means of intercepting on the higher levels, or outskirts, of the formation the rain or flood waters which sink into them. Becoming surcharged with this water any boring which is made from the surface to the lower impermeable strata will, at greater or lesser depths, intercept the water, which, from the hydrostatic pressure of that part of the accumulated water above the level of the surface of the ground at the site of the boring, will rise above the surface to the higher level at which the accumulated water stands. The presence and plentifulness of artesian water depends, in fact, on the rainfall of the higher regions, on the lower altitude of the bore site, and on the permeable character of the rocks below.

Artesian water-bearing rocks, the source of the present great outflow in Australia, form a part of the cretaceous formation. They consist of coarse porous sandstones, and were laid down in the shallow seas of a geological period ages ago. The formation is the result of the decomposition and disintegration of what at one period were very high mountains. The sun's heat, heavy rainfall, and floods did the work. The seas which received the *débris*, being tranquil and quiescent, were favourable to its deposit, and the estimated thickness of thousands of feet of the formation of chalk, limestones, artesian and other alluvial rocks, show the enormous period of time which must have elapsed in the deposit. Geological changes succeeded, and upheavals and depressions of the earth's surface took place, until the formation assumed the contours and other conditions of to-day. From a dead level they took an undulating curvilinear form from their outcrop to their termination. The fact is shown that with an approximately level character of the great plains the depths of the bores on them vary from 300 to over 5,000 feet.

In boring through the different strata of the earth in which water is found, the chalk of the cretaceous formation has afforded remarkable instances of successful operations. This strata itself in the "London basin," and in connection with the "lower greensand" which lies immediately underneath it in France, has produced the water of the artesian wells of London and the south coast of England, and the great wells of Paris. Actual experiments have proved that this rock is capable of receiving into its mass over five gallons of water for every cubic foot of rock beyond the quantity usually contained in dry chalk under ordinary exposure, and that each square mile of dry upper chalk, one yard in thickness, contains nearly three million and a half gallons of water. The "London basin" has been utilised by boring to an enormous extent, the wells at Chadwell and Amwell yielding over 4,000,000 gallons daily. The New River Water Works, the Houses of Parliament, Bank of England, the fountains in Trafalgar Square, and many of the great breweries, the London Jute Company, Ponder's End, and the Kentish Town Water Works have all drawn on this source for a supply.

As the explorations for artesian water in Australia have been comparatively limited, a greater development of the chalk member of the cretaceous formation may yet be discovered, but the enormous dimensions and capacity of the cretaceous water-bearing sandstones as at present defined give a supply amply sufficient for all requirements. The cretaceous sandstones are now the chief water-bearing rocks. In Queensland they have been shown to be 700 feet in thickness, and lie under nearly two-thirds of the total area of the State. They have a surface outcrop, or intake area, on the higher lands in the vicinity of the ranges, of a combined length of over 1,000 miles, with a minimum width of five miles, one continuous outcrop in the northern part of the State having a length of 280 miles, with a maximum width of ninety miles, the total area being nearly 65,000 square miles. Seeing that the State of Queensland has a surface of 668,000 square miles, the reader can form some idea of the enormous volume of good water which lies stored up beneath the surface.

In Western Australia there is a different variety of the cretaceous water-bearing formation, the calcareous sand-rock of the coastal districts, which is exclusively used for building purposes. This Æolian sandstone yields fine artesian water. At Guildford a plentiful supply is furnished at a depth of 400 feet, and at Perth 500,000 gallons per day are obtained at a depth of 800 feet. The source is the rain water, averaging between 30 and 40 inches per annum, which falls upon the Western slopes of the Darling Range and is absorbed by the sands at its base into the extremely porous calcareous sand-rock. As indicating the extremely porous nature of this country, it may be mentioned that many creeks issue from the foot of the Darling Range, carrying strong bodies of water, which completely disappear before reaching the coast 15 miles to the west.

In addition to the cretaceous formation there is, Mr. Pittman, the Government Geologist of New South Wales, tells us, every reason to believe that the Triassic or Jurassic coal measures may lie under the cretaceous formation, and that they will prove to be the principal storage beds of the artesian water supply of Australia. Similar formations yield large flows of artesian water in the States of Nebraska, Texas and Kansas, while a like flow takes place in the Moree bore in New South Wales. This bore is in the Ipswich coal measures or Jurassic formation, which exists in a continuous line from Southern Queensland.

One of the chief arguments used against the adoption of an artesian system in Australia was that there was no melted snow from great snow-clad mountains, as is the case in America, to supply the outcrop of the water-bearing rocks, and therefore the supply must be limited in quantity. The facts, since ascertained, are that the average outflow from the artesian bores in Queensland alone are far greater than those of any portion of similar territory in the United States of America, not excepting the famed artesian basin of Dakota, while the artesian rocks in Australia have also a greater development than formations of the same kind have in the United States. Again, the artesian wells made by the French-Algerian Government in the great African Desert of Sahara have proved of immense benefit to that country, which like the British possessions in Africa do not possess snow-clad mountains.

Here perhaps it may be interesting to explain the mechanical means employed in making a bore. The machinery now used in Australia has been largely evolved from the special exigencies of the country after fair and close trials of English, American, French and German apparatus. It is a powerful arrangement consisting of a derrick of wrought iron some sixty feet high, with pulleys at top and a timber platform at the foot. There is a huge timber beam seated or balanced on an upright post. From one end of the beam the drilling tools are suspended, the other end being attached to a crank movement connected with a "band-wheel" driven by a belt from a portable steam engine giving an up-and-down movement to the end of the beam over the bore-hole. The "string of tools," consisting of the bit which cuts the rock by impact, or a falling movement, the auger-stem, the jars and the sinker-bar above it, weigh no less than sixteen cwt., three-fourths of which gives the blow. The weight speaks for itself as to the powerful work they perform in perforating the rock, and also the size and power of the whole apparatus employed in working them by a lifting and falling movement. Poles of timber screwed together are used in some cases in lieu of a cable. The bores are cased with wrought-iron tubing from top to bottom, commencing generally with 10 in. and finishing, in the deepest bores, with 5 in. tubing.

And now as to the downward journey through earth, shale and rock. The engine is fired up and the attachments made, giving the crank motion to the working beam, which in turn moves the cable and the drilling apparatus. The driller takes his seat on a high stool above the chosen spot, adjusts the centre-bit, or drill, with great care, and down it goes through the conductor-pipe, striking from thirty to forty blows per minute, with a fall of about a foot at each stroke. Between the strokes the tools require to be moved around to make the aperture uniform and to prevent them wedging fast. With this is also connected a slight downward motion, every few strokes by a turn of the temper screw. The first operation tells the entire story. Day after day, night after night, the drill is kept moving up and down, cutting from one to six, or even twelve inches of the hardest rock or shale per hour, greater progress being of course made in softer strata. At intervals the centre-bit is drawn up, sometimes badly worn and battered, and a rimer is let down to enlarge the hole and make it smooth and round for the casing, and a sand-pump is then let down to raise the *débris* or excavated material.

To put down a bore and case it over 5,000 feet—nearly a mile —in depth, as that hereafter described, at Bimerah in Queensland, requires very great experience and skill and the utmost care and nicety of management. Visually nothing can be known of the operation going forward below. It is the "mind's eye" alone that can be relied upon, together with persistent and patient endeavour to carry on the work successfully.

Although in an article of this kind one has to deal with hard, scientific, mechanical and economical considerations, there is also an element of romance about Australian boring, as the following incident shows. At Guildford, near Perth, during a bad drought, I had just struck water. The sun was setting on the still summer's evening, and its last rays were playing on the column of pure water rising far above the surface, the background of green foliage affording greater beauty and prominence to its silvery sheen. Not far off stood an old man, who was returning to his native village, into which no knowledge or thought of artesian flows had ever penetrated. He was perplexed, puzzled, awestruck, at the extraordinary appearance of the column of water, and begged me to give him an explanation; but he went away saying, and apparently convinced, that it "maun be a wraith."

In giving figures and particulars of artesian boring to date in Australia, I propose to take Queensland as my example, because, although much valuable work has been done in other parts of the continent, notably in New South Wales, by far the largest number of bores have been made, and the attendant results have hitherto been greatest, in the northern State. The total number of bores in Queensland, including sub-artesian or non-flowing wells, is 891. Of these, 7 per cent. only were made by the Government, the remainder being carried out entirely by private enterprise. The aggregate number of feet bored is 1,066,605, equal to 202·01 miles, and the average depth per bore is 1,197 feet, ranging from 100 feet, an exceptionally shallow depth for an artesian flow, to 5,045 feet. Fifty-nine bores are over 3,000 feet deep, the deepest being 5,045 feet. There are 60 flows exceeding 1,500,000 gallons a day, the largest being at Coongoola (6,000,000 gallons). The continuous yield from 532 bores, at which the flow is known or estimated, is given as 351,295,254 gallons per day, and since the daily requirement of Brisbane is 4,393,000 gallons, many of the bores in the interior, discharging through a 6-inch pipe, would alone meet the demand, while two-thirds of the total outflow would supply the daily needs of London itself.

The bore water has, in some cases, cut its way for a distance of sixty miles, filling creeks, lagoons and low-lying places all over the district. During droughts the direction of the water may be seen for miles—a serpentine green-clad course with sheep and cattle drinking and feeding at will. Systematic channelling is, however, now being carried out. Contour levels are taken and ditches cut by special ploughs, while on many stations a number of bores have been made and paddocks laid out accordingly. Several inland towns are supplied by reticulation by the water under its natural high pressure, and the change wrought thereby is very great. Indeed it is hard to know which to admire and appreciate most, the gardens with their fruit trees in bloom and their flowers or the blanched linen on the laundrywomen's lines. Dynamos are also being worked for lighting the towns by electricity. The pressure is as high, in some of the bores, as 280lbs. to the square inch. The temperature at one of the bores gives 197 deg. Fah.—nearly boiling point—affording evidence of the molten state of parts of the interior of the earth. Allowing an increase of temperature of one degree for every 55 feet, 197 degrees gives a depth of 10,835 feet as the source of the flow. The greatest depth attained in Australia by boring is an artesian well at Bimerah in Queensland, which is 5,045 feet or nearly a mile in depth.

Irrigation by bore water is gradually coming into more general use. Grasslands, mostly on agricultural holdings, have been irrigated to the extent of 8,000 acres by this means, and sugar and other tropical products to the extent of 1,839 acres. Bore-water is also largely used for wool-washing, which can be carried on regularly and without dependence upon the weather and the rainfall. Similar irrigation work has been accomplished in New South Wales, notably at the Moree and Native Dog bores, where large areas of country have been brought under cultivation and are now producing crops of cereals and vegetables that have proved a revelation to agriculturists.

As to the features of artesian water-supply, such as ocean discharge, permanence of supplies, and evaporation, I can only make a short reference. Broadly speaking, my opinion is that the artesian water-bearing formation absorbs an enormous quantity of water; that the evaporation of the rainfall after such absorption at their source of supply is comparatively not worth mentioning; that they consist of a series of basin-shaped undulations, and that they exist, in all probability, mostly in a continuous series from the outcrop, or highest intake levels of the formation, and that the surplus water finally discharges itself by gravitation into the bed of the ocean "unseen" and "unrecorded." Without these outlets, the water-bearing rocks, being fully charged, would admit of no more water, and the result would inevitably be a system of surface rivers, which do not now exist, and a flooded state of the country at the intake areas and below, of the extent of which we can scarcely form a conception.

Bearing in mind the vast extent of the intake areas and feeders and the great thickness of the water-bearing rocks, and that so long as the rain falls—and a very large quantity does fall during the wet season—they will be replenished, it will be seen that the volume of accumulated water is so enormous that the comparatively small draught upon it even by thousands of bores would really amount to a mere bagatelle. In advocating the use of artesian water as the most feasible means of combating droughts, let me give a comparative estimate of the cost of reservoir (dam) making and artesian wells. In doing so I may point out that the Government of Western Australia is carrying out works to supply the Coolgardie district with water by means of a reservoir near Perth and a pipe line of over 300 miles in length. The capacity of the scheme is five millions of gallons only to be delivered daily at Coolgardie at a cost which will verge upon three millions sterling. Some of the Queensland bores, costing a few thousands of pounds, would fill the reservoir at Coolgardie daily, but unfortunately there is no artesian water at the Western Australian goldfields like the supply in the western country of other parts of Australia. The cost of the Queensland bores, extending over 1,000 miles of territory, and yielding, as stated, 351,295,254 gallons per diem, works out thus: number of bores, 532; average depth per bore, 1,197 feet = 636,804 feet, which at 25 shillings per foot, a fair average price, gives £796,005. The cost of reservoir making, taking as an example Taabinga, is, excavation for reservoir and constructing dam, £314 10s.; maximum capacity of reservoir, 11,400,000 gallons; area at high-water mark, 9·8 acres. This conservation of 11,400,000 gallons takes place usually only once a year, the accumulated water being doomed thereafter to deterioration and final exhaustion, quickly so sometimes, during droughts. Many of the artesian outflows would fill the reservoir every two or three days with good naturally filtered water all the year round, so that although the initial cost of reservoirs is less than that of the bores, the value of the bore water supply is immensely greater and more valuable than that of the reservoirs. Irrigation from these comparatively small reservoirs is out of the question, and they are only justifiable for watering stock outside the artesian areas.

In the great irrigation works of India, and those of Europe and America, the water is mostly derived from surface rivers, and it flows through channels, made at great cost, horizontally. In Australia it may be obtained from underground sources at any spot in the artesian areas, the water rising naturally in the bores. The result is much the same in both cases, but to the advantage, as regards cost, of Australia; so that in the near future, when a much larger and more general flow is obtained from artesian sources and systematic irrigation is established, the terrors of drought in Australia will be a memory of the past. It has always been a wonder to artesian engineers in Australia that the Australian Governments have not expended more money in placing water on the lands and less in the making of railways, many of which have not paid interest on construction. A suffering squatter once observed to me many years ago, "If my district was cobwebbed with railways they would be of little use unless I had water on the land."

The important character of the economic results arising from a well-developed system of artesian water-supply and irrigation thereby obtained will be seen from what I have written. Pastoral properties inaugurating artesian wells, with their regular, reliable, and permanent outflows, have gone up in value by leaps and bounds. One day I was in an agent's office in Brisbane when the agent received simultaneously two telegrams. One came from the owner of an unsaleable station in a dry, droughty part of the State and ran thus: "Don't sell large flow at bore." The other was from the contractor and contained the words: "Struck water flow three million gallons per day." Bore water in Australia has, in fact, revolutionised matters pastoral and agricultural, and the one depressing feeling of the people on account of aridity and droughts has given place to jubilation and a keen interest, both in country and town, in the present development and the future of artesian supplies. It is to be hoped that with the facts in evidence such apathy as existed in Australia, both departmental and private, in starting the movement may not prevail in other parts of the Empire.

W. Gibbons Cox, C.E. (late Member of Council Royal Geographical Society, Queensland, in the *Empire Review*).

Mr. Willcocks' Report on Irrigation.

By an Eastern Province Irrigation Farmer.

The difficulty of writing this report must have been immense, the time spent in the country being so short, the difficulties of travelling so great, and the necessity of taking information as correct without the possibility of confirming it absolutely necessary, if a report had to be made.

Naturally, under these circumstances, the report is only valuable as showing the possibilities of engineering skill in making dams and weirs on the large rivers of South Africa and the best sites for these, mainly with respect to foundation and the necessity of placing them more or less equidistant from each other. It would have been of more practical use if before Mr. Willcocks' arrival the best sites had been decided on with respect to the depth and richness of the soil; then, he could have given valuable information as to whether it would be possible to irrigate them with a reasonable expectation of a return on the capital necessary for the works.

It is perhaps some people's idea, and the report may give that idea, that it would be a good plan, if possible, to water the whole flat country in South Africa from its rivers. If the soil was not sufficiently good and deep for the cultivation of crops, the veld could be, by this means, made to carry a greatly increased number of stock. Of course, farmers of this country know that the result would be exactly the opposite; the natural grasses and bushes would be choked by such weeds as blue thistle, burr-weed, etc., the seed of which would be brought on by the water.

It is not the rule that land pays for irrigation, but the exception. Poor land near the river can be improved and cheaply manured by watering with silty flood water; but poor land ten miles and over from the river will get very little silt and would not pay for the works.

The dams and weirs advised in the report seem very high for rivers that rise rapidly, and the damage to the surrounding country would be immense if one of them or the banks gave way.

Mr. Willcocks is very strong on the great advantage the country possesses in its valleys and pans, and says he thinks the latter are impervious to water and that some are very brak.

Unless the valleys and pans are very different to those in this Colony, generally speaking, they will not hold water and the latter are all more or less brak. The flowing of water through them will diminish or nearly overcome the brakness; but when the water is flowing through, is not the time of their usefulness as reservoirs. When no water is flowing through they will probably be useless for irrigation, and if they hold water how is it to be got rid of?

The value of Mr. Willcocks' report is in what can eventually be carried out, not in what should be done in the present stage of irrigation in this country. This is a great and necessary help in starting irrigation, as all the smaller schemes started will have in view the future fullest development.

At present, having this report of ultimate possibilities, what is wanted is the detailed advice and continuous assistance of an irrigation engineer with experience of the best kind of irrigation works for such rivers as ours.

HORTICULTURE.

Practical Orchard Work at the Cape.

(*Continued from page* 566.)

THE APPLE.

At the Cape, the difference of climate and rainfall between West and East affects the apple very considerably. In the former, it is far less sought after and valued than are the peach and the pear, and the evidence of the seasonal market all goes to show that growers for sale have hitherto been satisfied with a few varieties and those rather poor ones. Choice apples of the very best sort are only to be found in a few amateurs' gardens and rarely appear on the market. Those most commonly seen appear to be bastard seedlings of the Red Astrakhan or some similar sort, and have passed through many stages of degeneration. In general they come late and stay long, and this is their main virtue, for neither in flavour nor size have they much to récommend them. Of late, however, most of the best kinds have been introduced and are now readily obtainable. The climate of the South-West coast region is not very favourable to the apple. It requires a season of complete rest. Hence its demands are best met by the dry, cold, and practically rainless winter of the Eastern Province. Westaway it does extremely well as soon as the higher levels are reached, and próbably the Koude Bokkeveld will one day be a noted apple-growing country, in virtue of the more uniform low temperature that prevails during the season of winter rest, in contradistinction to the capricious alternations of temperature of the coast-level. On these cool uplands the apple-tree is not forced into too rapid growth and premature bearing. It is likely that when fruit culture is better studied, high veld farmers will grow and send away an immense and creditable apple crop to coast markets, even as Kent, Gloucester, Hereford and Devon do in England.

The apple is not nearly so hard to please in the matter of soil as most other fruit trees. Provided its moderate requirements of lime, potash and phosphates are supplied, the nitrification going on in all soils under culture, with the ordinary stable manure in moderate supply, is amply sufficient to supply nitrogen. The present fashion of heavy top-dressing with guano and other ammoniacal manures is to be deprecated. They have a tendency to produce wood and foliage instead of fruit. The only soils in which the apple is not likely to repay culture (if the climate suits), are thin dry sands and sodden clays. A strong loam may be a good apple ground if it has plenty of lime naturally, or if lime be artificially added. Even heavy granitic clays, derived from the decomposed felspar, will grow apples when well limed to set free the potash which they contain in an insoluble state, and to flocculate the otherwise impervious mass. Probably the magnesia derived from the mica particles in these soils has an influence, for no fruit contains so much of that substance as does the apple. To the recognition of this fact is due the modern practice of giving an occasional light dressing of kainit to the apple orchard, that mineral supplying both potash and magnesia. But in all cases a quick ready drainage is essential, and in clayey loams it has to be expressly provided. Probably it will not be long before a demand arises for orchard drain-tiles. Drains laid with these are less expensive to dig and lay than any other sort, and if the bed is evenly cut to the given slope, they never fill up. The 2½-inch size is sufficient for branches and 4-inch for the main run. With similar machinery to that which is now turning out excellent bricks for the main drainage of Cape Town streets, there would be no difficulty in producing Cape-made drain-tiles in any quantity and at reasonable rate.

PROPAGATION.—Seedling stocks are raised from the pips of known sorts which have been recognised as strong growers. In England the crushed pulp of the cider-press is washed over and the pips separated. The special cider apples are all strong, vigorous sorts, hence there is the less need for particular selection. Some growers prefer the pips of crab wildings. But of late years the convenient fashion of dwarf low-headed trees has led to the general use of the Paradise Doucin stock, which produces a characteristic dwarf growth, just as quince stocks do for the pear. There is, however, one unfortunate disability about it. The Paradise stock is very liable to the attacks of the woolly American blight insect, *Schizoneura lanigera*, which is, in a less fatal degree, the scourge of the apple as the phylloxera is of the vine. Of this insect there are two forms or stages, one subterranean, on the roots, the other aerial, on the trunk and branches. The latter can be combated with comparative ease by repeated spraying. But no efforts avail to cope with the underground enemy and make a full end of him. Even bisulphide of carbon can hardly be applied in sufficient doses to destroy the insect without seriously injuring the roots themselves. And if the colonies on the stem and branches be killed out completely, new emigrants creep up from below, moult and change into the aerial form, and renew the plague. Exactly what has been done to circumvent the phylloxera on the vine roots is now being done in regard of the *Schizoneura*. It has been found that several sorts of apple, particularly the Northern Spy and the Winter Majetin, enjoy a comparative immunity from the attacks of the *Schizoneura*. Fortunately these two sorts have each their special character. The former has a strong erect growth and a compact fibrous root. The latter tends to make a more horizontal spread of branches, and has long rambling roots. There is little difference in their resistent power. Hence the Winter Majetin is selected for loose sandy soils of slight consistency, and in these its peculiar root-habit gives it a firm hold and enables it to maintain itself when a Northern Spy would certainly be blown over. All that has been said respecting the necessity for reconstituting the Cape vineyards upon the resistent *riparia* and *rupestris* may in a less urgent manner be pressed upon the attention of the fruit-grower whose speciality is the apple, and it would be well for those who are for the first time starting an orchard to refuse to purchase any apple graftlings which the seller cannot guarantee to be worked on one or other of the stocks above mentioned. For the present, doubtless, growers will be content to purchase their grafted resistent apple yearlings from those who make a business of supplying them. The method they follow is simple enough, though tedious. It is a form of double grafting, and is not likely to be popular among private growers. The operator picks out healthy portions of the roots of the resistent variety, about a span long and ⅜ of an inch thick. Upon these, scions of the same resistent apple are grafted, taking care that both root and shoot are of equal diameter. The English graft, so called, or whip graft with a tongue, succeeds best. To utilize pieces of root of smaller diameter, there is an ingenious device which might be called spur-grafting. This is easily understood from the figure, which, with some of the above details, is taken from an excellent *résumé* of apple-culture by A. H. Benson in the *N.S.W. Agricultural Gazette*, vol. v. p. 314. (May, 1894.)

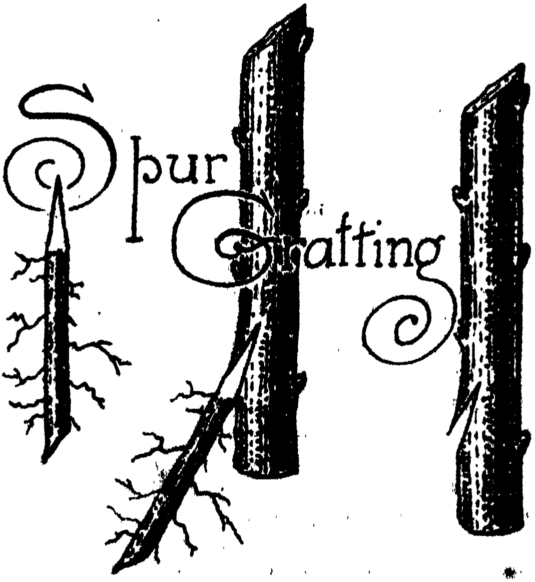

Figure 7. Details for Root-grafting.

A cut is made obliquely upwards near the scion, reaching almost to the central pith. The root-piece is cut to a double bevel of the same length as the cut in the scion, and inserted so as to match exactly its outside edge. In this, as in the former case, the junctions are to be carefully tied with raffia, slips of cotton, torn instead of cut from the piece, or worsted. No waxing is to be applied. The grafts are set out in nursery beds with the junction well below the surface, and great care is taken by mulching and other means to prevent drying out. The surfaces soon unite. The strongest and best placed bud on the graft is allowed to develop into a shoot, and all the rest are rubbed out. After a year's growth, when the grafting season comes round again, the special variety required is grafted upon this shoot, or if the shoot be strong enough, budding the selected sort may be done the same season. When these have made a start, you have a pedigree apple with a resistent trunk-base and resistent root. But both Majetin and Spy are strong-growing kinds of apple, and give their habit of growth, more or less, to the scions they bear. If therefore a dwarfing effect is desired, an additional step is requisite. Upon the resistent shoot, at the end of the first year, there is grafted a Paradise scion. When this is established satisfactorily, and the proper season arrives, the ultimate variety wanted is budded or grafted upon this Paradise intermediate bearer, and thus a peculiar dwarfing effect is transmitted to it. Thus we may finally have a tree which is, for example, Ribstone Pippin in its head of branches and upper stem, Paradise at the base and collar, and Winter Majetin at the roots. Perhaps some will consider a crop of apples not worth all this trouble. But this compilation is not written for those who want to avoid trouble. Those who long to grow apples without the never-ending warfare with the woolly aphis are the people addressed, and they will take any amount of trouble to be quits with the enemy, and also will not grudge the extra sum of threepence per tree charged by the nurseryman for his apple trees guaranteed to be worked upon resistent stocks.

PLANTING AND GROWING.—It has before been stated that it is best to purchase graftlings of a year old. When planted the little apple trees are cut back about knee-high, not only to give the roots the best chance of making a vigorous start before they are called on to supply moisture to a head of leafage, but far more to enable the grower to form the tree to pattern. It is a very common practice for those who have started a garden with no gardening knowledge to plant trees just as they come from the nursery and let them grow as they will. If you were to go to these amateur places, whip out your knife and cut the little apple trees down to knee-height, the owner probably would never forgive you. You might explain that a yearling with twenty or more buds, all starting, could not fail to grow a besom head of useless wastrels, crowding each other, and making fruit spurs only at the end of each switch. Whereas when only three or four of the buds are allowed to shoot from the cut-back remainder of a similar yearling, there would be as many fine strong radial bearers running up for a year, to be pruned back in winter for an exactly similar production of secondary radial shoots.

You might explain and get a grudging acquiescence. But you would always be looked upon as a sort of horticultural Herod among the Innocents. The great thing to be desired is that no one should undertake planting and training fruit trees unless he will consent to be taught by seeing the skilled practice of others. It is a common custom to leave more of the stem of an apple tree and a pear than would be done with stone-fruit trees. But care must be taken to let no more than four or five buds start on, and to choose these so that they divide the stem among them evenly. Thus, let the first be about nine inches above the ground, the next four or five inches higher and pointing not exactly opposite in direction, but about a third of the way round. Still higher, let the next budshoot start another span higher and fetch up another third of the circle. Clearly, if this be done with a little judgment, your mature tree will have a much stronger wood-system as its foundation than if all the three or four main branches started away from just about the same height. Nor is it advisable ever to permit more than four or five of these to go to the making of the tree. Four is decidedly preferable, and adhering to that number, small as it seems when the tree is young, will save an enormous amount of labour in after years in cutting out the useless perpendiculars that always form within the head of a tree that is too crowded.

If you have as yet no practised knowledge of sorts, begin from the first to acquire it by observation of the little ways your trees affect. They betray themselves to you, or rather, make you their confidant as you walk among them. Some sorts will let you see that they like to draw themselves in and run upwards as if they were imitating a poplar. Very good, it is for you to remember that habit, and always or mostly to *cut to an outside bud*, when pruning. You are their master—a skilled master you should be—and it is for you to lay down the law to your trees and make them obey. If other sorts are altogether too loose and careless, flinging their branches around, remember that peculiarity against them when the pruning season comes round, and conversely let the apical bud to which you cut point inwards. No grower should go through a strange orchard without mentally taking stock of the trees and the way they have been treated. The general habit of each kind, new to him, should be carefully noted and remembered. Such and such being its mature aspect, it follows that when you get it as a graftling of a year for yourself, you can recall what you have seen, and knowing what it should grow into, prune it accordingly. And when such experience enlarges, and you begin to feel able to rely upon it and to produce the exact effects you wish, you have taken the first step into the inner circle of gardening. You are no longer an outside philistine amateur, nor even an apprentice, but a passed-master of the craft.

THE PEAR.

Of all fruits raised in the orchard the pear is the one which bears up most sturdily against neglect and ill-treatment. Given an orchard, abandoned for a few years, the first trees to die out are the tender peach and apricot, then follows the orange. The apple comes next, overrun by the hateful woolly aphis above and below ground. Lastly comes the turn of the plum, exhausted by excessive suckering, and when it has dwindled from a tree to a stump with a bush of water-shoots atop, the pear will often still keep up a show of foliage, and perhaps still tempt the prowler with a few fruits as reminiscences of former fertility. The pear wants so little and gives so much.

The soil best adapted for the permanent growth of the pear is a moderately strong loam with enough lime in it to ensure its openness, situated upon a dry subsoil. It is impatient of flooding, and is put back by wet hanging about the roots for want of free drainage. Soils that are exceptionally rich stimulate a rampant growth of wood incompatible with good bearing qualities. Apart from extremes, however, the pear is not nearly so fastidious as the peach, and gives excellent results with any ordinary garden soil kept reasonably open and well drained.

The pear is essentially a "dessert" fruit, and is of somewhat more limited service than the apple. But it is just as distinctly a "keeping" fruit. In some respects even it has an advantage over the popular apple, if growers know their business properly. Let us see what this amounts to. Stated as a maxim resulting from experience, it is that the pear is never delivered by the tree in a state of perfection. The peculiar flavour of the choicest sorts, for example, Beurré Superfin, Beurré Clairgeau or Duchesse d'Angoulême, is not developed by the active chemistry of the sunshine and air. To do justice to the fruit it must be picked at an early outdoor stage of ripeness, and transferred to the lower temperature of a storehouse. There, amid cool air and away from the light in closed boxes or on shelves, the tissues have time to eliminate slowly the special amylic ethers which give the pear its distinction, and melt down the insipid cell contents into a rich buttery syrup. To eat pears from the tree is very poor epicurism, and argues small knowledge of the capabilities of this luscious dessert fruit. It is just such want of skilled judgment in picking and skilled handling in the storeroom which has led some to affirm that the climate of the Cape is unfavourable to the production of any but the commoner sorts of pear. The observation and experience of one season devoted to learning the trick of the pear, as to precise degree of out-ripeness, with dark storage to follow, would settle once for all that easy libel on the land we live in. And pray consider how this speciality of the pear plays into the hands of the merchant, as if of direct intent. There is nothing to prevent the storage-mellowing from being given while the fruit is in transit. It may easily be taken from the tree in the comparatively flavourless condition at which it will just *lift* from the spur on the palm of hand being placed below, and gently pressed against it, be packed in that state, and in due time come to judgment at some distant market in the highest possible condition—a mouthful for the gods. What more could a fruit do to assist the market grower?

If this speciality of the pear were universally known and acted up to, the fruit would soon take its proper place as a dessert delicacy of the highest class, and fine grown specimens would sell at dessert prices. And as it is no more costly to grow good fruit than bad, there would probably be an end to the sackfuls of wretched little green abortions which crowd our markets. The fruit-store or ripening-house should be fitted with skeleton shelves made of battens laid fairly open. These serve for ordinary fruit requiring free circulation of air and some manipulation from time to time. For pears, however, there should be provided flat shallow boxes with a close flap-cover, hinged on with leather strips. The depth will be about four inches, and the length and breadth about 24 by 18 or 20 inches. On the bottom is laid a very thin layer of buckwheat chaff, if it can be had, or finely cut and dried new straw. Over this goes a piece of cheap woollen stuff, and on it the pears are laid, close but not touching. The cloth is large enough to fold right over and cover the fruit completely. Then the lid flaps down and puts the pears in the dark. According to the kind, a space of time varying from three or four days to nearly as many weeks intervenes. All that is necessary is to remove any individual pear that has suffered a bruise, undetected at time of storing, and is bletting. If allowed to remain it would injure the flavour of its neighbours. In this way the fruit ripens to a rich, buttery consistence, possesses the indescribably delicious pear flavour *in perfection*, and takes the eye with a smooth skin and a high golden colour never seen on the fruit out of doors. There are many sorts which, without such treatment, ripen only to a dry, mealy consistence, flavourless, and even gritty. Winter pears of dessert kinds should hang as long as possible on the tree, and then be wrapped in paper, singly, and put away for keeping. Batches of these, in their turn, are transferred, a fortnight before use, to a warmer room at about 60° to 65°, and with this rise of temperature they too become buttery in consistence and full flavoured.

In the propagation of pears it is inadvisable to bud or graft on the chance suckers which rise in the orchard from the roots of other pears. Sucker stocks are generally poorly rooted, and follow their kind in producing suckers themselves. They therefore do not do full justice to the scion. It is far better to raise seedling stocks from strong, vigorous, common varieties, avoiding seed of the choicer sorts, in which the vegetative system has been more or less sacrificed to the fruit-bearing function. The raising of good pear-stocks requires more attention than is necessary for those intended for other trees. The fruit should be quite ripe so that the seeds come away from the flights of the core. It should not be allowed to dry out, but should be drill-sown while still soft in deep rich soil that has been previously trenched and manured. If the ground has been enriched with a little wood-ash, to supply potash salts, it will be all the better. The seedlings then have a chance of vigorous growth during the first year. This is all-important, for if not secured, the plants seldom turn out well subsequently, and one often sees poor, starved lots of pear-stock seedlings, three and four years old, raised anyhow in hungry soil, and, despite their age, far less fit for use than stuff grown as here suggested, and only twenty months from the sowing. Budding is to be preferred to grafting, and there is no tree which gives so few failures as the pear, when in good condition, owing to the thickness of the cambium layer on which the buds are worked. To secure a large percentage of buds that take well, it is important to have the stock as vigorous as possible, and decidedly in advance of the vegetative stage to which the bud-sticks have reached. This is secured by selecting the bud-wood some five or six weeks prior to the season most suitable for budding, and carefully laying in the twigs in a sheltered, shady situation in good soil, where they will lie by in a dormant condition while the stocks they are to serve are getting well ahead of them. This adjustment of *forward* stock-tissues to comparatively *backward* bud-tissues is a rule of practice invariably observed by the skilled propagator.

The pear will take kindly to many stocks besides its own. In England it is sometimes grafted on the white-thorn for use in stiff, clayey soil, where pear roots would not thrive. Some fanciers graft on the mountain-ash and medlar. Even apple stocks will carry a pear graft, but the accounts given of the result are contradictory. The American authorities say a pear on apple stock is very short lived, speedily killing itself with profuse fruiting. Stoll, the director of the experiment station at Proskau, recommends grafting of pear on vigorous young apple stocks, but acknowledges that their early productiveness is counterbalanced at the cost of longevity. The current practice in California, whose climate resembles our own, is to adhere to the self-stock, mainly because the custom there is to allow the trees to run up to standard size, often reaching thirty or more feet high. It is true, doubtless, that more fruit is produced by a given number of standard trees than can be got off as many dwarfs. But it must be remembered that an acre of land will carry many more dwarfs than it will of standards, a consideration which pretty nearly squares the comparison. Besides, with our violent gales and curiously perfunctory orchard labour, fruit borne aloft twenty to thirty feet above ground has scarcely one-tenth of the chance of getting harvested safe and sound that comes naturally to the fruit of dwarf trees hanging barely out of reach of a long arm. Taking all things into consideration, we are of opinion that at present the practice of pear growers will be towards dwarf trees rather than standards, and, in that case, self-stocks capable of use and giving good results will not be greatly called for.

The dwarfing stock *par excellence* for the pear is the quince. The pear bud takes kindly to it, grows vigorously, and the resulting tree bears early and well. There are just a few exceptional pear sorts which fail on the quince, and of these note will be taken hereafter.

But the general statement holds good, and it may even be affirmed that most of the very large pears whose weight renders them liable to be shaken off by the greater swaying of the boughs of standard trees, not only hold on better to the dwarf growth, but are distinctly improved in their characteristic flavour. Nor is this to be wondered at. There are two distinct tendencies in the fruit-tree—one is for the maintenance of the purely vegetative life of the individual, the other for reproduction of its kind by fruiting and consequent seed. The former results in vigorous wood-tissue, plentiful branching and abundant foliage, the latter naturally runs to fruit-bearing. Given an orchard tree—pear in this instance—which is not to be left to itself, but artificially dealt with to the profit of its owner, it is clear that the over-production of wood and foliage must be kept back by skilful treatment. The need of that check on vegetative tendencies is the *raison d'etre* of pruning. But let the same tree be grafted or budded on a stock which materially controls the ascent and descent of the sap, it is equally clear that we obtain a further check on rampant vegetative growth, and give an additional preponderance to the reproductive fruit-bearing tendency. The tree grows more of fruit and less wood. There too follows a practical corollary of some importance. Soils which are barely sufficiently fertile to give tolerable results with self-stocks will not prove satisfactory with those of dwarfing kinds unless assisted by judicious enrichments. The check upon the vegetative individuality of the tree may easily be carried too far if the poverty of the soil comes in as a further negative factor. Hence the well-founded custom of coupling rich soil with the use of dwarfing stock.

There are several sorts of quinces, as distinct as sorts of apples of a given race. The question as to which one suits this or that sort of pear has not yet been taken up in earnest and worked out. Unfortunately the scientific habit of recording the data of pomological work at the time it is performed, and subsequently collating results years afterwards, is exceptionally rare. Yet by such investigation of results it would be easy ultimately to arrive at valuable practical conclusions, and to be able to allot special quince stocks to special categories of pears. Doubtless this will be done some day. At present we are in the stage of pomological ignorance, in which a quince is a quince, and all quinces are alike. In France and Belgium, the pear countries *par excellence*, the Angers quince is recognised and selected for exceptional vigour. Most of those scattered all over the Cape appear to be derived from the Orange Quince, and occasionally one will meet with what seem to be seedlings of the broad-leaved strong-growing Portugal sort. Many of the better varieties have been imported recently, and are now in the market. The celebrated fruit-grower, Mr. Thomas Rivers, who was one of the first to introduce cultivation of the pear on quince stocks, has a note upon the disputed longevity of such trees. He says: "I have so often heard from market gardeners and others the opinion, 'It is no use to plant pears on quince stocks for they will not live long,' that whenever I have seen pear trees of mature age, I have looked to the stock to ascertain its nature, whether it was pear, quince or white-thorn, for I have known some healthy free-bearing pears grafted on the latter. Thus at Deepdene, near Dorking, I observed a number of fine pyramidal trees. They were all worked on the quince, and the gardener assured me they had been planted thirty-four years. They are very healthy, and are growing in a soil of the driest and lightest description. Presuming that they were three years of age when planted, they must be now nearly forty years old, and most certainly appear as if they would live and bear fruit for twenty years to come. A light, porous soil overlying a cool stratum is, I believe, the most favourable for the pear or quince stock. Hence should the soil in which they are to be planted be heavy and stiff, it should be corrected by a light compost, or pears on pear stock substituted."

Allusions have been made to the dislike which some fine sorts of pears seem to show to the quince stock, and the consequent difficulty of getting a perfect union. This is particularly marked with the Jargonelle, with Marie Louise and Bergamot Gansel; less distinctly with Beurré Clairgeau, Beurré Rance and Beurré d'Angleterre. As a general rule cleft-grafting has a better chance of success in these cases than simple budding. But the more satisfactory procedure is that of double grafting. Upon the quince stock is first worked a vigorous pear sort which takes kindly to it. After perfect union and sufficient growth, generally two years, the pear shoot is headed back and made to carry the bud or scion of the desired variety. Thus the vigorous Beurré d'Amanlis makes a most perfect intermediary between quince and Jargonelle and the two others above-named. Other strong growing sorts—*e.g.*, Beurré Hardy, Vicar of Winkfield, Beurré Noisette, Lavinicu, Jaminette, Beurré Vert—may be used to carry more tender or fastidious pear varieties, which, even if they make a sound, direct union with the quince stock, are rendered thereby slow of growth.

In this system of over-grafting, with its opportunities for new combinations, there is a great field open for experimental trials, and the last word respecting pear-culture on dwarfing stocks has by no means been said. A well known scientific gardener, Mr. F. W. Burbidge, draws the attention of amateurs to this promising branch of enquiry, and points to the results already obtained by his contemporary, Dancer of Chiswick, whose garden sends out annually hundreds of baskets of the very finest dessert pears to the London markets from bush trees all worked upon the quince stock. He declares "there is no comparison between fruit produced on standard or orchard trees on the pear or free-stock, and that from bush trees on the quince."

(*To be continued.*)

The Bitter Seville Orange as a Stock.

OVERSEA OFFICIAL OPINIONS.

Tropical Laboratory,
U.S. Department of Agriculture,
Miami, Florida, February 12th, 1902.

The bitter sweet orange is not used as a stock for oranges in Florida. The sour orange, which belongs to the same variety as the bitter sweet, is used largely for stock from the fact that it is very resistant to mal-di-gomma. The sour stock is best for our rich hummock and low lands, but the rough lemon makes the best stock for dry sandy and rocky lands. It is very subject to mal-di-gomma, but that fungus does little damage on the dry sandy soils.

I infer that you are using the bitter sweet stock, which at one time was thought to be an excellent stock but which has dropped out of the market altogether. If you have a close compact clayey soil I would advise you to use the sour stock, but if your soil is a loose sandy one, use the rough lemon. *Citrus trifoliata* might also be worth trying, this being used by our friends of northern Florida with considerable success.

You doubtless know that the sour orange is wild in this State. Several large groves are wild groves of the sour orange top-worked with sweet. The lime is also wild here, but this is a more dwarf tree than the sour orange and so is used only to a limited extent as a stock.

I trust that I have made myself clear in this matter. The people of Florida have lost lots of time and money in the last twenty years by not knowing what stock to use, but at present there is a very uniform consensus of opinion on this one point.

P. H. ROLFS,
Plant Pathologist in Charge of Tropical Laboratory.

County Board of Horticultural Commissioners,
Riverside County, California.
Riverside, California, Feb. 17th, 1902.

I have taken some time to investigate the merits, etc., of the Florida sour orange stock. I will give you the opinions of both growers and nurserymen as I find them. Some fifteen years or more ago, many of our growers and nurserymen were captured by the alluring statements sent out by those who were financially interested in Florida stock. These statements referred to the superiority of this stock for use in budding, grafting, etc., also great stress was placed upon the fact of its immunity from frost, disease, etc. Most if not all of these claims have by experiment proved to be false. The peculiarity of the stock is that for the first year or two after being budded a vigorous and healthy growth is secured, after which it seems to come almost to a standstill or at least its growth is very slow. It produces here a dwarf tree of any of the varieties to which it has been budded.

I am under the impression that our Southern Californian climate is too dry and hot for this variety of stock, as it is often found in Florida and Louisiana in swamps where the roots are completely immersed in water. Under these conditions it seems to thrive best.

I was unable to find a single person here who has tried it that was satisfied with his experience with it as a stock. If you have sections that are low and moist, you would doubtless have fairly good success with the sour stock. But my advice would be to go very slow in introducing it in a general way, as I am sure it would result in disappointment. I have never heard that fruit grown upon this stock is inferior in flavour to that grown on sweet stock, but the general objection seems to be that the root appears to be entirely out of its environment in our section. The claim that it is immune from mal-di-gomma is, I presume, correct. We have never been seriously troubled with this malady, though we have the gum diseases affecting the branches quite badly in some localities.

R. P. Cundiff,
Chairman of Riverside Horticultural Commissioners.

Louisiana Sugar Experiment Station,
Audubon Park, New Orleans, La.,
February 18th, 1902.

The bitter stock, whether identical with the Bitter Seville or not (because the Bitter Seville is a specified variety of the bitter kind), has proved admirably adapted to all our varieties of oranges, save the Washington Navel. This Washington Navel does not seem to do well anywhere in the eastern portion of the United States. In California it does well upon both sour and sweet stock. Sour stock here is believed to be proof against or has powers strongly resistant to mal-di-gomma.

Since 1895 we have had two severe freezes which absolutely destroyed our orchard, and therefore we have no data since the bulletin published in 1893 that are worth relating. The Florida sour seed seems to be, to some extent, a cross upon the wild lemon which was left in that country in the early settlement of the Spaniards, and in order to get at the pure sour orange it would be well perhaps to go into the coast region of this State, where trees have survived the wreck of freezes and the axe of the woodsman. Such trees are exceedingly rare and it is only occasionally that we find one.

Wm. C. Stubbs,
Director Louisiana State Experiment Stations.

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CITRUS.

The main question to decide at Hope up to the present has been that of suitability of the various species and varieties of citrus for use as stocks on which to bud. The results obtained indicate that the rough lemon and sour orange are equally good as stocks for the Bahia and Washington Navels, and that the rough lemon is the best for the Grape Fruit. The ordinary Jamaica sweet orange does not do well on either of the stocks, not nearly so well as the Navel or the Grape Fruit. None of the imported varieties of the sweet orange have as yet been tried at Hope. Preparations are being made for planting out stocks of both the rough lemon and sour orange on which to bud the varieties now growing at the Hill Gardens.

Department of Agriculture, Queensland,
March 25th, 1902.

Some thirty years ago the Sour or Seville orange stock was tried in New South Wales as a stock for both oranges and mandarins, but not, as far as I am aware, as a stock for lemons, at any rate in quantity. Trees grew well on it at first, but were not a success; as after a few years they went back, and some of the oldest trees I remember worked on this stock, some twenty years old, were stunted and poor, showing signs of the so-called die-back. The varieties worked thirty years ago in New South Wales were types of the Portugal orange, locally known as Paramatta, and types of the St. Michael orange. I do not remember seeing any navels worked on this stock; so that they probably died out prior to my coming to New South Wales in 1892. I am not aware of any nurserymen having tested this stock for any of the recently introduced citrus varieties obtained either from America or the Mediterranean; so that I cannot say how these varieties are likely to thrive on it. In New South Wales the stock most commonly used is that of the common lemon both for oranges, mandarins and lemons, as this stock is found to suit the shallow soils of Cumberland County, the head-quarters of the citrus industry of New South Wales. The seedling sweet orange is also used as a stock especially for deeper and better soils. In this State I do not know of the Seville having been used to any extent, as here we find that the seedling sweet orange is the most satisfactory for all kinds of oranges. Mandarins are usually worked on seedling mandarins, either Empress or Scarlet types; and lemons are either worked on seedling sweet orange or common lemon, though the latter stock is unsuited to our soil and climate. The tree itself grows practically wild, but is a very unsatisfactory stock, and trees worked on it are always short-lived, inferior, and extremely liable to the attack of all insect pests. The Seville orange does remarkably well here, and is generally grown as a seedling. It might possibly make a good stock, but as the sweet seedlings do so well, it has not been tried on account of its not being a success in New South Wales. It is probable that we will test a few lemons on Seville stocks to see if we can improve the quality of the fruit, as the lemon in this State, especially if grown near the coast, is coarse, overgrown, and the fruit itself is full of gum.

The following are some of the principal varieties of oranges and mandarins grown in this State that do well, viz., orange or seedling orange, Washington Navel, Selecto, Salina, Maltese Oval, St. Michael and Portugal, Mandarin on Mandarin seedlings, Emperor, Scarlet, Beauty of Glen Retreat, and several unnamed seedlings of merit. The Thorny Mandarin is not a success in most places, the fruit being often coarse and dry.

Of lemons, Lisbon has done the best all round; the variegated Lisbon promises well, and the Villa Franca and one or two imported varieties are doing fairly in suitable localities; though our climate is usually too forcing for the lemon, the fruit being commonly overgrown and coarse. The Tahiti Lime does remarkably well here.

Trusting that this information may be of some use to you; and although I am afraid I cannot point definitely to any variety of orange doing well on Seville, still I would not like to condemn it for this State without a thorough trial. The sweet seedling stock is so satisfactory that our nurserymen are not likely to make any change.

ALBERT H. BENSON,
Horticulturist.

VETERINARY.

Heartwater in Sheep and Goats.

In previous reports I have pointed out that the experiments conducted principally by Veterinary Surgeon Dixon clearly demonstrated that Heartwater was not communicated by the ordinary sources of infection, such as immediate contact, if the in-contact animals were kept free from ticks. It has also been shown that it is not due to any particular plant which the stock eat, because goats which were allowed on infected veld with a flock, but muzzled so as to prevent them from feeding, and were only fed on good sound forage at night, contracted the disease as readily as if they been allowed to graze; nor is it induced by the lack of any essential food constituents such as common salts or phosphates in the general vegetation of the infected area, for goats which were fed exclusively on good forage, and in addition received a daily ration of bone meal and saline constituents for several months consecutively, readily contracted the disease when exposed to veld infection. The experiments also demonstrated that the cause was neither atmospheric nor telluric, for goats which were tied up in the low lying spots, specially selected in one of the most infective localities, the vegetation being previously destroyed by fire, and all other sources of infection—especially ticks—excluded, the animals remained perfectly free from any appearance of infection, although proved by subsequent experiment to be susceptible.

Drenching animals with large quantities of the fluid contents of the rumen of goats which died, or were killed, during an attack of Heartwater failed to communicate the disease, and even large doses of virulent blood administered by the mouth also failed to produce the disease. In fact where tick infection was excluded Mr. Dixon failed to communicate the disease to healthy sheep and goats, except by inoculation with virulent blood, obtained from an affected animal. It became very clear, therefore, that Heartwater belonged to that class of diseases which owe their origin to some living micro-organism, which, when introduced into the blood of a susceptible animal, multiplies and develops in that vital fluid, and gives rise to all the characteristic pathological changes which are observed in that disease. There is the period of incubation—from eight to ten days—followed by fever, and terminating in an effusion of a clear straw-coloured albuminous fluid into the thoracic cavity and pericardium, with other less marked changes. The characteristic of this fluid is that it coagulates into a jelly as soon as it is exposed to the atmosphere.

The result of these experiments led us to suspect that ticks, or some such skin parasites, were the active medium of communicating the infective agent of Heartwater by skin inoculation. Mr. Dixon then commenced a series of experiments with the red and the blue ticks—*Rhipicephalus evertsi* and *Rhipicephalus decoloratus*—respectively, but with negative results. He tried at the same time to hatch out the larvæ from the eggs of the Bonte-tick—"Amblyoma hebraum"—but failed owing to an unusual peculiarity in the conditions and period of incubation, subsequently discovered by Mr. Lounsbury, the Government Entomologist, who at this period recommenced the study of the tick side of this question, which he has continued to prosecute in a most enthusiastic manner ever since and with the most satisfactory results, as his annual report for the past year will show. Mr. Dixon then devoted his attention to the discovery of a preventive remedy by means of inoculation. He found that the disease was communicated by inoculation either subcutaneously, intravenously or intra-thoracic, the media used being virulent blood, spleen pulp, and also occasionally the thoracic and pericardial fluid when fresh. He found that the disease can be transmitted by these methods from sheep to sheep, from goat to goat, and from sheep to goat, and from goat to sheep.

The following are the lines on which a series of experiments were undertaken, first by Mr. Dixon and continued and enlarged upon by Mr. Spreull, with the object of discovering a method of preventive inoculation.

Inoculation with bile.—A series of inoculation experiments with bile obtained from an animal which died of the disease were tried in varying doses, but it was soon apparent that bile gave very little immunity, although some farmers extolled it highly. The fact that the disease will sometimes cease to spread in a flock without any obvious cause may account for this temporary popularity which the bile obtained.

The blood and serum of Cattle and Horses.—Inoculations with the blood and serum of cattle and horses after these animals had been fortified by the injection of large doses of virulent blood were tried, but although the blood and serum of these naturally immune animals, especially of the horse, possessed a certain amount of antitoxic action, injections of even large doses gave but a very slight immunity against either artificial or natural infection.

Preserved virulent blood.—Inoculations with virulent blood which was preserved (*a*) by adding 5 per cent. of glycerine, or (*b*) ½ per cent. of carbolic acid in a watery solution, were tried, the mixtures being kept for twenty-four hours before being used, but the results obtained by either of these methods were very irregular and uncertain.

Citrated virulent blood.—This citrated virulent blood was mixed in normal saline solution, 1 to 3, and kept for varying short periods and then injected intravenously, but it proved very irregular in its action and effects.

Serum of virulent blood.—This was used fresh one to two days after tapping, filtered through paper. One goat received 7 c.c. intravenously without producing any reaction, but when tested with 2 c.c. of virulent blood intravenously, on the fortieth day it took sick, and died fourteen days later. Another goat received 10 c.c. intravenously, no reaction followed, nor did it react to 2 c.c. of virulent blood injected intravenously on the twenty-seventh day, but when retested with 3 c.c. on the fiftieth day, it died fifteen days later. This line of experiments was therefore abandoned.

Antithermal blood.—Experiments were undertaken with the object of ascertaining the period at which the blood becomes virulent in an animal sickening from Heartwater. These showed that the blood becomes virulent in an acute case produced by inoculation, from twenty-four to forty-eight hours before the onset of the fever. In one very rapid case the virulence of the blood appeared six clear days after the intravenous injection of virulent blood.

Small intensive doses of virulent blood.—This series of experiments were undertaken with the object of intensifying the modified reaction obtained by the injection of small doses of virulent blood intravenously. For example, a dose of 1.5 c.c. of fresh citrated virulent blood injected intravenously fails to produce sickness by itself, but the same dose repeated on the ninth day caused death, and even when the second dose was delayed until the twelfth day, it still produced fatal results. When delayed until the sixteenth day no fatal results followed in five animals so treated, yet no good reaction followed. Mr. Spreull adds: " Further experiments may show that better results may be obtained if the second inoculation were performed about the fourteenth day, but individual susceptibilities vary so greatly that success in this line is not very hopeful.

Serum experiments.—With respect to these Mr. Spreull reports :—In our early work with Heartwater it was found that the fortified serum of a recovered animal was strongly antitoxic, and since then many attempts have been made to so balance a lethal dose of virulent blood with an inhibitive dose of serum that a mild sickness or fever reaction and recovery might be obtained. Bad as results have been up to the present (this was written in September last), it is this method which has produced almost the whole of the salted animals we possess, and it has consequently continued to attract our attention and inspire us with hope. When I relieved Mr. Dixon, I took over four full-grown goats—Nos. 136, 137, 138 and 139—into which he had injected intravenously 3, 4, 5 and 6 c.c. of a two to one mixture of carbolized serum and fresh citrated virulent blood; not one of these animals reacted, but when on the twenty-seventh day I repeated the inoculation, using exactly the same doses to each, but altering the proportion of the mixture to seven of serum to four of virulent blood, I killed all four without any lengthening of the incubatory period. The serum used in this case was not the same, but was thought to be equally potent. It was used again in the next three experiments, and with slightly better results. Nos. 140, 145 and 146, kids from eight to ten months old, received into the vein 6, 5 and 4 c.c. respectively of a mixture of virulent blood four parts, with carbolized serum seven parts, kept twenty-four hours before using it. No. 140 died from Heartwater on the fifteenth, No. 146 on the eighteenth day, both being fevered for three days, whilst No. 145 did not react. On the twenty-fifth day No. 145 received exactly the same dose for the second time, and again showing no reaction, it received the same dose, 5 c.c., of a mixture in which the blood proportion had been raised to nine-fourteenths of the whole. This produced sickness, and death fifteen days after injection, fever lasting five days. On September 11th three goats, Nos. 199, 201 and 202, each received intravenously 2 c.c. fresh virulent blood and 3 c.c. carbolized serum, which were mixed together just previous to injection. This was followed by a subcutaneous dose of the same serum, No. 199 receiving 5 c.c. on the 13th. No. 201, 5 c.c. on the 14th, and No. 202 o/c.c. on the 15th day. No. 201 died suddenly on the 16th day, the autopsy being typical, No. 202 also showed sick on the 16th, and died next day. No. 199 gave a most remarkable and prolonged reaction extending from the 17th to the 40th day or later, being generally mild in character except on the 33rd day, when it suddenly reached 106° F. in the morning and 107.7° F. in the afternoon, falling during the next two days to a mild fever level, the end of which it is difficult to fix with exactitude. This extended fluctuation gives one a remarkable insight into the slow manner in which an attenuated Heartwater vaccine must effect its results upon the animal system, and sounds an ominous warning against early testing. Blood was drawn from this No. 199 on the 23rd day, and 3 c.c., 5 c.c. and 10 c.c. injected into goats Nos. 209, 170 and 159 respectively. No. 170 reacted well and is probably salted, but the other two became violently fevered, in both cases up to 108° F., fed sparingly, and in fact narrowly missed death from Heartwater. Other goats have been inoculated with No. 199's blood taken at later periods during its reaction, but it is too soon yet to speak of results.

The Blood of a recovering animal.—The object of this series of experiments is explained by Mr. Spreull as follows :—My previous experiments in connection with Heartwater taught me that the blood of an animal recovered from the disease became mildly antitoxic some weeks afterwards, and could be made strongly so by fortification. It occurred to me, therefore, that there must be a period of transition between the febrile or virulent, and the antitoxic stages. In the hope of obtaining a blood falling short of lethal, yet strong enough to set up changes in inoculated animals which would induce immunity, I instituted a series of inoculations at varying intervals with blood taken from recovering animals.

Mr. Dixon had previously performed two inoculation experiments in this series with 5 c.c. of blood at five and nine days respectively, and both these animals died. I therefore began with a later and more attenuated blood, performing half of the inoculations intravenously and half subcutaneously. These inoculations were made at 11, 15, 16, 20 and 25 days after the fever stage had passed. The results were extremely irregular at first, many did not react to the inoculation, while others had varying degrees of fever, but none of them withstood the subsequent test of virulent blood, even when the testing dose was gradually reduced from 5 c.c. to 2 c.c. What led me to expect immunity from these recovering inoculations was the fact that blood taken from these reacting goats ten days or more after their reaction had ceased, very often produced a similar elevation of temperature in a third, fourth, fifth and sixth series of goats. In no case did these reactions show any signs of illness, yet the fever was often so acute that I dreaded the onset of the fit which so rapidly terminates cases of real Heartwater.

I next tried a simultaneous injection. Two goats received each 10 c.c. of blood obtained from a reacting goat of the fifth series on the 16th day, when it was highly fevered, and to this was added 1 c.c. and 1.5 c.c. respectively of virulent blood. Both goats reacted to this inoculation severely, one from the 10th to the 15th day, and the other from the 12th to the 16th day, in both a temperature of 107° F. was registered, yet no visible symptoms of disease appeared.

Referring to this series of experiments in a subsequent report Mr. Spreull says:—"Since my last report, I have kept up a new chain of reactions, little short of the actual disease in their virulence, by always selecting animals in which symptoms were developed, and waiting until the tenth day, or later, after the temperature became normal; by these means the same pitch of virulence seemed to be well maintained. By tapping earlier, that is, before the reaction ceased, lethal blood, indistinguishable from true virulent blood, could be obtained. On the other hand, by delaying until the 20th day or later, after the cessation of the fever, mild reactions, or none at all, were produced."

After detailing a long series of experiments on these lines, Mr. Spreull continues:—"From the above it will be seen that any dose of 3 c.c. or more of recovering blood is sufficient, and that we can with moderate care hit upon a period of safety at which fairly severe reactions can be produced with certainty and continued in series." At a later date he returned to the experiments with simultaneous inoculation intravenously of small doses of a mixture of virulent blood and of recovering blood. He says:—"Observing that it became more and more difficult to produce a reaction by inoculating fresh goats with blood drawn from a goat twenty days, or over, after the temperature had returned to normal, I attempted to strengthen this blood by the addition of a small—that is, less than a lethal—dose of virulent blood, and after a number of failures, I think I can claim to have fixed a date when this can be done with comparative safety."

After detailing the series of experiments which led up to this result, he makes the following recommendations: "As 2 c.c. occasionally proves lethal, 1 c.c. or 1.5 c.c. is enough to give in this method of inoculation, and I would make the amount of this dose depend upon the age of the recovered blood, or the number of days after cessation of the fever in the goat which is bled to provide the recovered blood."

The intensity of the attack has also to be considered. The dose of the recovered blood may be anything over 3 c.c., as it appears immaterial whether 5 c.c. or 10 c.c. is used.

The inoculating mixture therefore consists of (*a*) less than a lethal dose of virulent blood, and (*b*) blood from an animal just over 30 days recovered. In these experiments Mr. Spreull points out that subcutaneous inoculation is never so regular and satisfactory as intravenous inoculation, even when the same materials are used.

The test to which the inoculated goats are put.—Mr. Spreull concludes his report as follows:—"If you have succeeded in following all these details, you will be prepared to admit that something little short of virulent Heartwater has been produced—a scrutiny of the charts should satisfy you on that point—and I am sure that an inspection of the animals would have convinced anyone. In many of the *reacters*, the appetite disappeared, the respiration became hurried, decubitus was constant, and nothing but the fit seemed wanting to complete the very short train of symptoms which are witnessed in the Heartwater contracted on the veld."

But notwithstanding these strong fever reactions, many fail to resist the intravenous injection of 5 c.c. of virulent blood, or even a 3 c.c. dose. The question arises, is this intravenous test too severe? It is very evident that no animal which has not shown a fever reaction of 106° F., and over, for at least a week, can withstand an intravenous injection of even 3 c.c. of virulent blood. The next question is, how many of those animals which give a strong fever reaction, but fail to stand the test inoculation, would be able to resist veld infection? Experiments show that a 3 c.c. dose of virulent blood injected intravenously would kill 95 per cent. of healthy susceptible animals inoculated with it, but veld infection falls far below that. The point for future consideration and experiment, therefore, is, what fever reaction will be sufficient to withstand veld infection, and to this Mr. Spreull is directing his attention at the present time.

D. Hutcheon,
Colonial Veterinary Surgeon.

ENTOMOLOGY.

Longevity of a Species of Tick.

That any kind of tick, other than the so-called "sheep tick," which is not a tick at all but a wingless fly, is pestiferous in the British Isles will be news to most South African farmers, even those of British birth and training. But quite as many distinct species of ticks are recognised there as at the Cape, and at least one kind, the "grass tick" (*Ixodes ricinus*, Latr.), may be termed a pest. This species is suspected of transmitting a troublesome disease called "louping-ill," just as our Blue Tick transmits redwater, the Bont Tick, heartwater, and the Dog Tick, malignant jaundice or distemper. Louping-ill is widely known in Scotland as "trembling," and is thought by some to be the same complaint known as "shivering" or "the shivers" in Lancashire and Yorkshire in England. Some months ago the Board of Agriculture of Great Britain appointed a Departmental Committee to fully investigate louping-ill, and before long we may expect to learn whether or not the belief that the grass tick is concerned is founded on fact. One of the committee, Mr. E. G. Wheler of Alnwick, Northumberland, England, has already made many valuable observations on the life history and habits of the tick; and in the course of a paper entitled "Parasitically Inoculated Diseases," published recently in the Transactions of the Highland and Agricultural Society of Scotland, he details some information that is of practical interest in every tick-infested country. He writes :—

> "In 1898 I commenced observations as to the life history of the tick that is parasitic on sheep in Northumberland, and I contributed a paper on the subject to the Royal Agricultural Society's Journal in 1900. The only species I found on sheep was *Ixodes ricinus* (Latreille), locally known as the 'grass tick.' It had previously been supposed that various varieties of ticks attacked the sheep. In the nymph stage they generally adhere to the faces of the sheep, and are locally called 'face ticks.' The larvæ are so minute as to generally escape observation. The adult females range in colour from white to red, reddish-blue, blue, and even black, according to the extent of distension, so it is easy to understand why they have been mistaken for different species. . . . . . . The grass tick passes each stage of its existence on the sheep—viz., as larva, nymph and adult—but after repletion always drops off the host either to undergo its next metamorphosis or to lay eggs. Each individual has therefore to find a fresh host three times in its existence. For this purpose it climbs the stems of rushes and other coarse herbage, and with its front pair of legs hooks on and clings to the host as it passes, or else creeps on to it when lying down.
>
> "Grass ticks die in the course of two or three days if kept in dry corked bottles, but if a little damp sand or fresh moss be added they are capable of living a great length of time without food. Under these circumstances they make no perceptible growth. I have kept them for the following periods :—

Larvæ fasting...	19 months.
Nymphs „	18 „
„ distended, taken August 14, 1899 (these moulted August 4, 1900)	12 „
„ as adults	15 „

> Some of the latter are still alive, thus having been in captivity twenty-seven months without food.
>
> "Another of the same batch was found, after moulting, to have no head. That such a malformed creature could exist at all is extraordinary, but nevertheless it survived fourteen months in captivity, and was eventually lost by accident. This tick demonstrated clearly that fasting was absolute during that time, as under such conditions feeding was obviously impossible. None of the above periods must be considered as maxima, as in all cases of death the grass ticks apparently died from want of moisture through insufficient attention. . . . .

> "The duration of the life of ticks is very largely influenced by climatic conditions. Cold weather retards development at all stages. I am of opinion that, given a warm and genial season, grass ticks might, under very exceptionally favourable circumstances, pass the whole term of life from the egg to the mature adult in one season, say from March 1st to October 15th. The usual period would probably be two seasons, but under unfavourable conditions life might be prolonged for several years.
>
> "In 1897 a portion of the Alnwick deer park, where *Ixodes ricinus* is abundant, was fenced off from the deer, which are much infested by these ticks. No stock of any sort has been allowed on this ground since that date, but rabbits, field-voles, and other small mammals are fairly numerous. Last year grass ticks were still present on this ground, but this year (1901) I could find only two nymphs after a long search, at a time when the ticks were unusually numerous in the adjoining deer park. These probably had passed the larval stage on some small mammal, at which time the grass ticks will feed on almost any host that presents itself. From these data it may be inferred that the removal of stock for four years is not quite sufficient to starve out the ticks, but that result would probably be achieved in five seasons."

It is hardly probable that any of our South African species of ticks would survive without food for the extended periods mentioned by Mr. Wheler, that is in our South African climate, but the matter has never been fairly tested. Our common dog tick, like the grass tick, soon succumbs if kept in a dry bottle, but our other common species are very hardy under this seemingly unfavourable condition, as indeed they need to be to exist in a climate characterized by long droughts and extreme dryness. The Bont and the Bont Leg (Bontepoot) will both as larvæ remain alive in dry, cork-stoppered bottles for six or seven months. It is clear, however, that hot, dry spells affect them unfavourably, for each one brings an increased mortality. Under natural conditions out of doors such spells would often have to be endured, and in this climate of open winters the removal of stock for two or three seasons would probably suffice to starve out ticks.

C. P. L.

STOCK FARMING.

The Importation of Goats from South Africa.

Mr. D. A. Walker, Carlton, Oregon, writes on the above subject to a recent *Oregon Agriculturist* in the following strain :—

A dispatch sent out from Washington recited that the Secretary of Agriculture has decided to prohibit the importation of Angora goats from South Africa on account of the prevalence of rinderpest in some portions of that country. Mr. J. B. Stump has received a letter from Mr. Holmes in which the latter says that Mr. Hoerle has given up the attempt to get South African goats into the United States.

We cannot find fault with efforts to keep dangerous diseases out of the United States, but this matter of bringing in Angora goats presents some exceptional features which appear to make it unwise to shut South African goats out of the United States at this time.

In the first place, there is no doubt that the infusion of the blood of choice Angora goats from South Africa will be of great value to the Angora industry in the United States. The industry in that country has been one of importance for a long time. More mohair was exported from South Africa in 1874 than was produced in the United States in 1899. More than ten times as many Angoras were taken from Turkey to South Africa as have been brought to the United States. For many years skilful breeders in South Africa have been encouraged by high prices to enjoy their talents in developing valuable strains of the Angora. That the blood of Angoras bred in that country adds greatly to the value of American Angoras is shown by the experience of C. P. Bailey & Sons. Their imported buck, Pasha, has added thousands of dollars to the value of his descendants, among which is numbered the buck Pasha Columbia, which sold at Kansas City last fall for $1,050.

That the American Angora breeders appreciate the fact is evident from the efforts which Messrs. Stump, Riddell, Hoerle, Hoag, the Montana Angora Goat Company, and others are making to secure Angoras from Cape Colony.

The obstacles in the way of importation are great. The fact that there is no direct line of steamers from South Africa to the United States has been the main cause of difficulty. It has become necessary to take advantage of the sailing of occasional steamers from that country direct to this country to get goats through.

The Government of Cape Colony is strongly opposed to the exportation of Angoras from that country. Some time ago the Parliament of the Cape of Good Hope passed an Act levying an export tax of about $500 on all Angoras exported. Breeders who were opposed to the enactment of this law secured an amendment which provided that the law should not be operative until all the other governments in South Africa passed similar laws. At that time it was very improbable that all of these countries would fall into line, but changed conditions have simplified matters for those opposed to exporting Angoras, and Mozambique is now all that stands in the way of the law going into effect. The *Agricultural Journal*, published by the Government of Cape Colony, is stirring up sentiment against exporting Angoras, and there is no telling how soon the consent of Mozambique may be obtained to the Export Bounty Act.

We understand that there is no rinderpest in the portion of Cape Colony from which it is sought to secure Angora goats, and that the Government maintains a very rigorous quarantine against the districts where the rinderpest prevails.

As the South African goats will be of so much value to us if imported, and the chances of securing them are in grave danger of being cut off entirely, while there appears to be very little danger of importing the rinderpest, we think the Secretary of Agriculture should not prohibit importations at this time. It is apparently a case of now or never. There is no other place except South Africa to which we can look for good blood for the improvement of our goats. The matter is one which appeals to every person who is interested in breeding Angoras. We hope that the breeders will write to the Secretary of Agriculture and to members of Congress about this matter, explaining the situation and urging that importation be permitted under such regulations as may be deemed wise to prevent the introduction of disease with the goats.

It is the height of folly to say that we already have plenty of good Angoras in the United States now. We have good Angoras—some as good, perhaps, as any in South Africa; but we have not enough good Angoras, and too large a proportion of our good Angoras are closely related.

Prickly Pears as Forage.

A great number of dairymen and pig breeders in this district (states a Singleton message to a Sydney paper) are engaged at present feeding their stock on prickly pears, on account of the great dearth of forage, caused by the prevailing drought. On many of the holdings throughout the district prickly pears thickly abound, and the occasion gives the opportunity to rid the land of them, and at the same time to keep stock alive until rain falls. Boiling and burning are the means resorted to, at option, to make the pears palatable. In the first case they are chipped down with a hoe, pitchforked into a dray, and conveyed to boiling-down pots. After-being boiled for some hours, until the leaves begin to peel, it then is found that the large hard thorns become quite soft, and the little bristles, which are so irritating to the tongue, are also rendered soft and harmless. The contents of the boiler are then allowed to cool, after which the "soup" is run off into the pig trough, and is greedily devoured by the pigs, the effect of the plant on the water being to render it of almost jelly-like consistency. For the boiled plants the stock evince a great liking, chewing up the succulent leaves and stalks, and spitting forth the fibre perfectly macerated. Though we have made a number of enquiries, we have yet to learn that any of the stock showed the least sign of internal trouble from the thorns or bristles. As to pigs, it is not, of course, to be expected that the cooked plant of itself would fatten the pigs, but some of the breeders have no hesitation in placing the feeding value of the plant higher than that of melons and squashes. The expense, too, is simply the cutting down and carting of the plants, boiling is a mere trifle, and there is, in addition to the feeding value of the plants, the advantage of absolutely ridding large areas of land of this troublesome pest. As to the second method of burning, this is done by throwing the plants between two burning logs, and after the thorns and bristles have been burned off, cattle will eat the plants so treated.

COUNTRY REPORTS.

Bizana.

MAJOR H. SPRIGG, R.M. :—The month of March has on the whole been a good one. Two hailstorms have occurred and done some damage to fruit and vegetables, but not to the main crops. In some parts of the district harvesting has commenced.

Butterworth.

J. M. YOUNG, Actg. R.M., 5th April, 1902 :—During the past month the weather ranged from excessive heat to severe cold. Moderate rains fell and the pasturage is in excellent condition. One fresh outbreak of lung-sickness was brought to my notice, the usual steps being taken to isolate the infected herds. Stock of all kinds are on the whole in fairly good condition.

Elliotdale.

W. T. HARGREAVES, 29th March, 1902 :—Large swarms of locusts have been hatched along the coast and have done considerable damage to the mealie crops. Fungus was used but with very poor results, owing, I presume, to the dry weather experienced down there.

The Natives are still striving very hard to keep them out of their gardens. A fair amount of rain fell in the upper part of this district, and the prospects of a good harvest are fair provided the frosts come late in the autumn. The pasturage is excellent and cattle and horses are in good condition. A good number of sheep have died from heartwater.

Engcobo.

Chas. E. Warner, Actg. R.M., 8th April, 1902:—February was a very dry month. Rains began at the end of the month. In some parts of the district there will be a scarcity of grain and in other parts about half a crop will be reaped. Several showers have fallen during March, and the pasturage, which was becoming parched, is now excellent. A fair crop of Kaffir corn will be reaped. Mealies in some parts of the district are a failure and in other parts about half a crop is expected. Oathay is plentiful in this district.

Flagstaff.

Reg. C. Heathcote, R.M., 29th March, 1902:—The weather during the past month has been somewhat changeable accompanied by a good deal of rain. The crops are very fair and the harvest promises to be an average one. The pasturage is still very good and stock in good fettle. No diseases have been reported.

Idutywa.

F. E. C. Bell, R.M., 8th April, 1902:—Pasturage has been fairly good. The month has been a dry one. All early sown crops have failed. The late sown crops look well. The probable harvest yield will be half the quantity the district is capable of producing in a good season. Rinderpest broke out in the middle of the month on the southern border of the district. The disease shows no signs of spreading.

12th April, 1902:—Pasturage has been in fair condition. Rain much wanted. No improvement in harvest prospects. There have been several cases of miltziekte. Rinderpest has not spread beyond the herd in which it originally broke out. Twenty head of cattle have died of the disease.

Kentani.

Newton O. Thompson, R.M., 3rd March, 1902:—During the past month crops have suffered severely from want of rain. Only light showers have fallen, and even these have not been general. Crops will not be good this season, but if rain falls shortly some of the late mealies may come on fairly well. Pasturage is good and no diseases reported during the month.

7th April, 1902 :—A few showers of rain fell during the month and these have done good to the late mealies, but at best only a half crop will be reaped this season. Pasturage continues good and stock looking well.

Libode.

J. C. GARNER, R.M., 1st April, 1902 :—The Natives living in the vicinity of the Umzimvubu, Tina, Tsitsa and Umgazi Rivers in this district have already commenced harvesting, although the yield has not proved equal to the early anticipations. The rainfall for the past month has been a very heavy one taking into consideration the time of the year. Stock of all kinds are in good condition at present and there is no disease amongst them.

Lusikisiki.

R. W. STANFORD, R.M., 29th March, 1902 :—Very little rain has fallen during the past month but no appreciable difference is noticed in pasturage, which remains in its usual state of excellence. The harvest has not yet commenced but green mealies are being hawked about by Natives for sale. Stock are generally free from disease and in good condition.

Mqanduli.

LESLIE FARRANT, R.M., 1st April, 1902 :—Plenty of rain has fallen and crops revived. Except in cases when sown late and where locusts have done damage, the harvest will be sufficient for the people of the district. Pasturage is excellent and stock in good condition and generally healthy. Gall-sickness has killed three or four cattle during the month. One death of a cow from redwater has been reported. Shearing is just commencing.

CLEMENT GLADWIN, A.R.M., 8th April, 1902 :—The commencement of the month of February showed signs of being one suitable for the cereal crops and the country generally, but unfortunately the dry weather set in and parched up virtually everything to such an extent that the crops will be very scanty. Owing to the dry weather stock are not looking well, though no diseases have been reported. Locusts have not made their appearance in this part of the district, though young swarms have been reported nearer the coast.

Nqamakwe.

C. J. WARNER, R.M., 1st April, 1902 :—Good and abundant rains fell during the past month and will be of much benefit to the late crops of mealies. With the exception of one or two cases of redwater no diseases were reported among cattle. All other kinds of stock in good condition.

Ngqeleni.

W. F. C. Trollip, Acting R.M., 4th April, 1902:—During the first half of the month the heat was intense and there was very little rain, but towards the latter portion the cold weather set in accompanied by light rains, and an early winter is predicted. The tobacco crop was a good one but the prices were very low. Very little disease was reported amongst the stock. The Natives have been very busy shearing their sheep, and a large quantity of wool has been bought up by the traders.

Port St. John's.

W. J. St. J. Turner, R.M., 3rd April, 1902:—The crops in this district with few exceptions are good, especially Kaffir corn. Tobacco is plentiful and of very fair quality. Stock are healthy and in good condition.

St. Mark's.

A. L. Gladwin, R.M., 3rd April, 1902:—February remained an exceedingly dry and hot month, and rain did not fall until the second week in March. The mealie crops are a failure and Kaffir corn little better. Pasturage has recovered and is good. Redwater and lung-sickness continue throughout the district. All other stock are doing well.

Tabankulu.

T. A. Norton, R.M., 3rd April, 1902:—There is little to add to my last report. Toward the end of the month abundant rain fell which should give grazing for the winter. An outbreak of redwater has occurred, but with this exception and the lung-sickness already reported, stock are healthy and in good condition.

Tsomo.

W. Thomson, R.M., 3rd April, 1902:—The rainfall registered during the month was 2.54 inches. Redwater appears to be breaking out in all parts of the district; many cases have been reported, and placed in quarantine, during the month. I have asked several their opinion as to what it is caused from; some state one cause and some another. It is very probably due to the excessive heat during the months of January and February. The pasturage is looking better than it was a month ago, but I think the rains have come too late to do much good for the crops. Locusts have not yet appeared. Stock, both large and small, are in good condition.

Umtata.

A. H. B. Stanford, R.M., 12th April, 1902:—After a protracted drought, rain fell about the middle of last month, and although too late to benefit standing crops much, has greatly improved the pasturage. Cattle are in good condition; lung-sickness is dying out and other stock are healthy.

Willowvale.

W. Liefeldt, R.M., 3rd April, 1902:—Notwithstanding the efforts made to destroy the voetgangers many locusts have now reached the winged state and are doing much damage to the green Kaffir corn. The mealies planted after the ravages by the large swarm of locusts reported by me in December last are now suffering from grub, and less than one-half the usual crop will be the result; and I fear that grain will have to be imported into the district at or towards the close of the year to prevent the Gcalekas from starving.

Artificial Manures.

The annexed list showing the agents from whom the various artificial manures may be obtained, and the current prices, is publiseed for the information and guidance of agriculturists.

Full particulars as to the composition of the respective fertilizers can be obtained on application to the agents; and attention is also invited to the analyses published in the *Agricultural Journal* of 9th January, 2nd April and 11th June, 1896; 30th Sept., 1897; 27th Oct., 1898; 13th April, 6th July, 1899 and 18th July, 1901.

List of Fertilizers.

Attwell & Co., Cape Town. (Agents for Alex. Cross & Sons, Ltd., Glasgow.)	Special Root Guano ..	£6	10	0	per ton of 2,000 lb,
	Potato and Grain Guano ..	8	5	0	,, ,,
	Nitrate of Soda	12	0	0	,, ,,
	Superphosphates 39/40 per cent ..	6	0	0	,, ,,
	Scotia Basic Slag (cont. 30 per cent. Tribasic Phosphate of Lime)	4	15	-	,,
	Sulphate of Ammonia ..	0	19	6	per 100 lb.
	(Prices free on trucks, Cape Town)				
Jas. Searight & Co., Cape Town.	No. 1 Superphosphates (containing 12·14 per cent. Phosphoric Acid soluble in water, being equal to 26·80 per cent. Tribasic Phosphate of Lime). ..	£5	0	0	per ton of 2,000 lb.
	No. 2 Superphosphates ..	5	10	0	
Jas. Searight & Co., Cape Town.	(containing 14·16 per cent. Phosphoric Acid soluble in water, being equal to 30·35 per cent. Tribasic Phosphate of Lime). ..				
	No. 3 Superphosphates (containing 17·18 per cent. Phosphoric Acid soluble in water, being equal to 37·89 per cent. Tribasic Phosphate of Lime). ..	£6	0	0	per ton of 2,000 lb.
	Vine Fertilizers	9	0	0	,, ,,

A reduction of 5s. per 2,000 lbs. is allowed on orders of 100 bags or more. Special rates can be arranged if delivery is taken ex importing steamer, the goods being trucked at Docks.

Woodhead, Plant & Co. Cape Town.	Powder ..	£4 15 0 per ton of 2,000 lb.
	Superphosphates	5 15 0 " "
	Nitrate of Soda	14 0 0 " "
	Muriate of Potash	16 0 0 " "
	Sulphate of Potash	16 0 0 " "
	Wheat Fertilizer	8 10 0 " "
	Kainit	4 15 0 " "
	Potato	1 15 0 per 200 lb.
	Vineyard Manure	1 15 0 "
	Tobacco Manure	1 15 0 "
	Sulphate of Ammonia ..	1 2 6 per 100 lb
	Subject to a discount for cash.	
De Waal & Co., Cape Town.	Jadoo Fibre	10s. 6d. per bale of 100 lb.
White Ryan & Co., Cape Town.	Potato, Vegetable and General garden	£8 10s. per ton of 2,000 lb. If less than ½ ton 18s. 6d. per bag of 200 lb.
	Pure Ground Bone	£6 10s. per ton of 2,000 lb. If less than ½ ton 13s 6d. per bag of 200 lb.
White, Ryan & Co., Cape Town.	Quick-acting Bone and Potash Mixture	£7 per ton of 2,000 lb. If less than ½ ton 16s. per bag of 200 lb.
	Selected Bone Meal for Cattle, Horses, Pigs and Poultry ..	15s. 6d. per 100 lb.; special price per ton.
	Bone Grit for Fowls ..	12s. 6d. per 100 lb.
	Superphosphates ..	Wholesale only.
Malcomess & Co., E. London.	"Malcomess" A. Fertilizer, for Potatoes, Mealies, Vegetables, Orange and other trees ..	£9 per ton of 2,000 lb.
	"Malcomess" B. Fertilizer, for cereals, especially wheat ..	£9 per ton of 2,000 lb.
	Accompanied by guaranteed analysis by Prof. Hahn ..	(less 5 per cent for cash).
James Flower & Sons, Cape Town.	"H.B.T." Gypsum	£3 10s. per ton of 2,000 lb.
	Pure Ground Bone Meal	£8 10s. " " (in bags f.o. trucks—Cape Town).
Government Guano:—	Ordinary Guano	£6 10s. per ton of 2,000 lb. or 13s. per bag of 200 lb.
	Rock Guano	£6 17s. per ton of 2,000 lb. or 13s. 9d. per bag of 200 lb.
	For use within limits of Colony. Price includes delivery at Cape Town Railway Station.	
D. E. Hockly & Co., East London.	"Hockly's Special Fertilizer." A complete manure for all crops	£9 per ton of 2,000 lbs. less 5 per cent for cash.
	Pure Bone Meal	Special Price.

The Feather Market.

Messrs. Wm. Spilhaus and Co. report under Saturday's date, May 17, as follows:—

Ostrich Feathers.—Arrivals still continue to come forward slowly; in consequence, there was only a small quantity offered on this week's sale. We make prices generally unchanged, compared with last week. Business 220 lb., which sold for £748. We quote:—

	£	s.	d.	£	s.	d.
Whites (primes)	12	0	0	15	0	0
Firsts (super)	9	10	0	11	0	0
Firsts (ord)	8	0	0	9	0	0
Seconds	6	0	0	7	0	0
Thirds	4	0	0	5	0	0
Inferior and stalky	2	0	0	2	10	0
Byocks	4	10	0	6	0	0
Feminas (super)	7	0	0	9	0	0
Firsts	5	0	0	6	0	0
Seconds	3	10	0	4	10	0
Thirds	2	0	0	3	0	0
Inferior and stalky	1	0	0	1	5	0
Dark	3	10	0	5	0	0
Spadonas (White)	1	15	0	2	5	0
Light and Dark	0	10	0	1	0	0
Boos (White)	1	10	0	1	15	0
Light	1	2	6	1	7	6
Black Butts	0	10	0	0	12	6
Dark	0	7	6	0	12	6
Inferior	0	4	0	0	6	0
Blacks (Long)	4	0	0	5	0	0
Long Medium	2	0	0	3	0	0
Medium	1	0	0	1	10	0
Superior Short	0	10	0	0	15	0
Ordinary Short	0	7	0	0	9	0
Long Floss	1	5	0	1	10	0
Medium Floss	0	7	6	0	12	6
Short Floss	0	3	0	0	5	0
Drabs (Long)	2	10	0	3	5	0
Long Medium	1	5	0	1	15	0
Medium	0	12	6	1	0	0
Superior Short	0	5	0	0	7	6
Ordinary Short	0	2	0	0	3	0
Long Floss	1	5	0	1	10	0
Medium	0	7	6	0	12	6
Short	0	2	0	0	3	0
Inferior Long Blacks and Drabs	0	17	6	1	5	0
Inferior Floss, Blacks and Drabs	0	4	0	0	6	0
Wings	0	0	6	0	1	0
Chicks	0	1	0	0	1	6

GOVERNMENT NOTICES.

Cape Government Railways.

ADMISSION OF APPRENTICES INTO THE LOCOMOTIVE DEPARTMENT.

There are vacancies for Apprentices in the following Branches of the Locomotive Workshops at Salt River

Boiler Shop	Three boys for heating rivets and cleaning Boilers, to learn the trade of a Boilermaker.
Carriage Shop	Two boys, to learn the trade of a Sawyer.
Carriage Shop	One boy, to learn the trade of a Carriage Fitter.
Carriage Shop	Two boys, to learn the trade of a Coach Builder.
Carriage Shop	Two boys, to learn the trade of a Coach Painter.
Blacksmith Shop	One boy, to work steam hammer ;

and applications from youths between the ages of 14 and 16 are invited for filling the vacancies.

Applicants must have passed the 5th Standard, and will be required to produce a certificate to that effect, and also certificates as to character.

Applicants who are able to produce proofs of having satisfactorily passed a higher standard of education will receive the preference in filling the vacancies, other things being equal.

The rate of pay to commence with will be 2d. per hour.

Applications should be sent to the Chief Locomotive Superintendent or Locomotive Superintendent, Salt River, from whom any further particulars can be obtained.

Office of the General Manager of Railways, Cape Town,
8th March, 1902.

T. R. PRICE,
General Manager.

Farmers' Apprentices. Dairy Assistants, &c.

As inquiries are from time to time received from young men from abroad as to where they may serve apprenticeship or gain practical experience of farming in this Colony, before starting on their own account, the Secretary for Agriculture invites Farmers who are willing to receive young men of good character, for this purpose, to register their names with the Under Secretary for Agriculture, stating the class of farming they do, how many young men they are prepared to take, and for what period they would enter into an agreement.

It is not probable that these young men will be in a position to give more than their free services in return for the experience they will gain; that is, they will not be able to pay any fee; and they will look to receiving free board and lodging in return for their services.

It is to Farmers, therefore, who are willing to grant such young men free board and lodging in return for services rendered, that this application is especially addressed.

With reference to the above notice to Farmers, the Secretary for Agriculture now invites young men who are willing to engage themselves as Farmers' Apprentices in Cape Colony to register their names with the Under Secretary for Agriculture, Cape Town. The apprentice will gain experience in farming in South Africa, and have an opportunity for spying out the land before starting on his own farm. To the new comer from another country this is essential, for he has much to learn and unlearn.

Many applications for such Apprentices have been received from Farmers in the Colony. It will be noted that the Apprentice will neither receive wages, nor pay a fee. He will get free board and lodging in return for his services, and at the same time acquire the experience he is in need of.

Applications for employment have also been received from several Lady Dairy Experts and Dairy Assistants; and Dairy Farmers and others desiring to avail themselves of the services of such are invited to register their names with this Department, giving particulars as to situation and extent of operations, etc., and salary and other emoluments they are prepared to offer.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM BASUTOLAND.

By command of His Excellency the Governor, the following Proclamation No. 164, 1901, was published in the Government Gazette of October 29th, 1901:—

Whereas by Proclamation No. 100, bearing date the 4th day of June, 1901, I did by reason of the existence of the disease amongst cattle known as Rinderpest in the Territory of Basutoland, prohibit the introduction of horned cattle from the said Territory into this Colony:

And whereas the said disease has spread to the portions of this Colony which adjoin the said Territory, thus rendering it unnecessary to longer maintain the prohibition imposed by the said Proclamation:

Now, therefore, under and by virtue of the powers and authorities in me vested, I do hereby proclaim, declare and make known that from and after the date hereof the prohibition upon the introduction of horned cattle from Basutoland into this Colony shall be removed: the said Proclamation No. 100 of 1901 being hereby repealed accordingly.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM ORANGE RIVER COLONY AND THE TRANSVAAL.

By command of His Excellency the Governor, the following Proclamation No. 139 1901, was published in the Government Gazette of August 16th, 1901:—

Under and by virtue of the powers vested in me by the "Animal Diseases Act," No. 27 of 1893, and by the "Animals Diseases Rinderpest Amendment Act," No. 2 of 1897, I do hereby proclaim, declare and make known that it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced into any part of this Colony from the Orange River Colony and the Transvaal, save and except such cattle as may be required to be introduced by the Government for the purpose of supplying Bile or Serum for inoculation against Rinderpest:

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed

And I do hereby further declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

Proclamation No. 217, bearing date the 29th day of October, 1900, together with the regulations issued thereunder, is thereby repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed and to bring to justice any person who may contravene the same.

Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined Regulation for checking the spread of the infection is republished.

REGULATION ISSUED UNDER PROCLAMATION NO. 30, DATED 20TH JANUARY, 1899.

Whenever under the provisions of Sections 11 and [illegible] of Act No. 27 of 1893, any area is declared or proclaimed to be an area infected with Rinderpest, it shall not be lawful for any person, animal, animal produce, article or thing, who or which may, in the opinion of the Magistrate of the District in which such area is situated, to convey infection of Rinderpest, to leave or to be removed therefrom.

Inoculation Against Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of the Colony, it is desirable to inform stock-owners of the intentions of the Government as to dealing with the outbreak should it unfortunately become general in the Colony, and to advise stock-owners as to the best course to follow.

The Government propose that, as a general rule, cattle-owners themselves should perform the inoculation. Glycerinated Bile will be used, though circumstances may arise where it will be preferable to use Serum.

Bile Stations will be established in suitable places as necessity arises in localities where farmers have agreed to contribute the required proportion, say 5 per cent., of their cattle for production of the bile. It must be clearly understood that unless farmers are prepared to thus contribute the necessary cattle, it will be impossible for them to have the benefit of a Bile Station.

Glycerinated Bile will be issued free to contributors in proportion to the number of cattle contributed to a Bile Station. To non-contributors a fair charge will be made for bile if any be available for issue.

Serum will be charged for at the rate of £1 per bottle of ten doses.

A limited supply of Glycerinated Bile to meet emergencies will, for a time, be available, free of charge, from the Bile Station which has been established under arrangements with the Imperial Military authorities near Aliwal North.

As occasion requires, Demonstrators will be sent to instruct farmers in the method of inoculation, free of charge. They will, as a rule, inoculate only enough cattle to show how it is to be done, leaving the owner to continue the work. The Government will supply syringes on application to the Resident Magistrate, or to the Demonstrators at the following charges: 20 cc. capacity, 20s; 10 cc. capacity, 15s. This payment may be recovered on return of the syringe to the Magistrate, in good order.

After the experience gained during the outbreak of 1896-1898, the Colonial Veterinary Surgeon wrote* as follows:—

"The method of inoculation which I would recommend in future sporadic outbreaks of the disease is briefly as follows:—

"*Infected Herds.*—These should be inoculated at once with either serum or glycerinated bile; every animal which indicates infection by a rise of temperature should receive a large dose of not less than 100 cc. of serum, or 30 cc. of glycerinated bile; the latter should, by preference, be injected into the jugular vein, so as to secure its immediate action. Then from eight to twelve days after, all the animals in the herd which give no indication of being infected with the disease, or fever temperature should receive an injection of pure bile; not less than 10 cc., and for large animals 20 cc. This will confer a lasting immunity sufficient for all practical purposes.

"*Clean Herds.*—When it is decided to inoculate a clean herd, which is in danger of becoming infected through its proximity to diseased cattle I would recommend that the animals composing the herd should be inoculated first with 20 cc. of glycerinated bile, and to follow this inoculation in from eight to twelve days with an injection of from 10 to 20 cc. of pure bile. This will confer a strong and lasting immunity on the animals in the herd, and will be free from risk arising from the inoculation or of introducing the disease.

"*Use of Pure Bile.*—Pure fresh bile should not be used in an infected herd, if any of the other inoculating materials can be obtained, as it tends to intensify the character of the disease in those already infected, and its immunising effect is too slowly developed to protect the healthy cattle against infection, if they are left in contact with those already sick. If no other means are available, however, the temperatures of the whole of the cattle in the infected herd should be carefully taken by the clinical thermometer, and only those which register a normal temperature should be inoculated with pure bile, the others should be separated from the inoculated lot at once, and carefully tended. If glycerine can be obtained, the spare bile should be mixed with it in the proper proportions—one part of glycerine to two parts of bile. This mixture, after standing forty-eight hours, may be injected into the affected animals in large doses, not only with safety, but with marked benefit.

"*Preparing the Bile.*—The bile should be taken from an affected animal immediately after death, or from one which is killed in the last stage of collapse.

Journal, June [illegible], 1899, in which will be found a full consideration of the inoculation.

"Biles of all shades of colour—except those which are red from the presence of blood—may be used, so long as they are clear and free from a putrid smell. Thin light yellow biles should also be rejected.

"All the galls extracted at one time should be mixed together, after standing separately for twelve to eighteen hours, so as to render them uniform in strength and immunising properties. Pure bile should be used on the second day after being drawn, unless it is kept in an ice chest, when it may be kept sweet much longer. But if pure bile is used as a second inoculation only, as above directed, it is not desirable to keep it longer than twenty-four hours.

"Glycerinated bile is made by adding one part of glycerine to two parts of bile, stir the mixture well, then mix all the biles taken at one time, and allow them to stand for eight days. But if there is urgency, the glycerinated bile may be used forty-eight hours after it is mixed.

"I would strongly recommend that in every outbreak of the disease that occurs, every drop of suitable bile, obtained from the animals which die, should be mixed with glycerine in proper proportions, two parts of the bile to one of glycerine, so that it may be preserved and made available for the inoculation of infected herds, and also for the first inoculation of clean herds which may be considered in danger. Pure bile for the second inoculation of clean herds can always be obtained when the disease appears in any locality, which would be the only reason for inoculating clean herds in the immediate vicinity."

Taking the Bile.—To remove the bile the animal must be laid on its left side, the skin and flesh on the right side immediately behind the last rib being cut through; the ribs being raised, the gall bladder will become visible. The gall bladder should be then punctured with a small knife and the gall allowed to escape into a wide-mouthed bottle. If wide-mouthed bottles are not available then ordinary whisky bottles may be used with an *enamelled* funnel, which can be procured at any country store. Every precaution must be taken that the operation is performed in a thoroughly clean manner, the hands of the operator and all knives, &c., being thoroughly cleansed before use.

Inoculating.—After having secured the animal to be operated upon, the necessary dose of bile is injected under the skin of the dewlap by means of a Hypodermic Syringe, care being taken that the point of the needle is not inserted into the flesh, but between the skin and flesh.

Symptoms of Rinderpest.

The Outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined description of the symptoms of Rinderpest is hereby published:—

The early symptoms of Rinderpest are a rise of internal temperature to 106 or 107° Fahr.; the animal stands with its head hanging down, ears drawn back and coat staring; it refuses all food and occasionally shivers. A mucous discharge flows from the eyes and nostrils; the extremities are cold, and the breathing is laboured and frequently accompanied with moaning. The inner part of the upper lip and roof of the mouth and all visible mucous membranes are reddened, and covered with an eruption of minute pimples, and later with a branlike exudation. The bowels are occasionally constipated, but in most cases diarrhœa sets in, the evacuations being slimy and very frequently of a dirty yellow colour. The prostration of strength is great, the animal staggering when made to move. In milch cows the secretion of milk is rapidly diminished, and soon ceases altogether. The disease usually ends fatally in from six to ten days.

It is generally believed that the infection is produced through the respiratory organs; from there the contagion becomes generalised. The contagion exists in the secretions and excretions, urine, saliva, mucous secretions of the nose, mouth and eyes, in the sweat, expired air, blood, and in all the tissues. It may be conveyed directly by the diseased animals, or indirectly by the dung, the bedding, the earth, hides, wool, meat, clothing, wagons or vessels, by people, dogs, sheep and chickens, &c. Contagion takes place only through short distances. When the weather is dry this is reduced to its minimum (about 27 yards), and the progress of the disease may be stopped by a ditch separating the diseased from the healthy animals.

In order to detect the earliest symptoms of Rinderpest, owners of horned cattle are warned of the urgent necessity for keeping a constant and close watch upon t
Any suspicious cases should be immediately reported to the nearest Resident

Field-cornet or Police Officer, and the sick animal kept separate till an inspection is made. Stock should be carefully examined daily by a responsible person, more particularly for any symptoms resembling those above described.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation wa published in the *Government Gazette* of the 30th October, 1900:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth n the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B' hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz :—

Number and general description of Cattle } ....
....
....
Owner's name and address } ....
....
In charge of..
Place to which Cattle are being sent..............................
(Signature)..
(Address)..
Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature..
Address)..
Date......................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz. :—

Number and general description of Cattle } ....
....
....
Owner's name and address } ....
....
In charge of..
Place to which Cattle are being sent..............................
(Inspector's signature)..
(Address)..
Date....................

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

Destruction of Wild Carnivora.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, 17th May, 1902, as telegraphed by the Civil Commissioners of the places respectively named, is published hereunder.

CENTRE.	A Wheat per 100 lb.	B. Wheat Flour per 100 lb.	C. Boer Meal per 100 lb.	D. Mealies. per 100 lb.	E Mealie Meal per 100 lb.	F. Barley per 100 lb.	G. Oats per 100 lb.	H. Oat-hay per 100 lb.	J. Potatoes per bag	K. Tobacco (Boer Roll.) per lb.	L. Beef per lb.	M Mutton per lb.	N. Fresh Butter per lb.	O. Eggs per doz.	P. Cattle (Slaughter)	Q. Sheep (Slaughter)
	£ s. d	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s d	£ s. d.
Aliwal North ..	...	...	...	...	...	...	...	...	...	...	...	...		...	...	...
Beaufort West .	0 13 0	0 13 0	0 12 6	0 13 0	0 13 0	0 12 0	0 13 0	...	0 15 0	0 1 0	0 0 10	0 0 7	0 1 9	0 3 6	£20 to £38	20/- to 21/-
Burghersdorp ...	0 7 6	...	...	0 10 0	...	0 8 0	...	...	0 8 0	0 1 9	0 0 8	0 0 7½	0 1 0	0 3 0	...	...
Cape Town ...	0 10 0	0 12 6	0 11 0	0 9 0	0 9 6	0 8 0	0 9 0	0 9 6	1 2 0	0 0 6	0 0 7	0 0 8½	0 1 9	0 2 3	17 0 0	1 4 0
Clanwilliam ..	0 13 0	1 10 0	1 5 0	...	...	...	...	...	1 2 0	0 1 4	0 0 8	0 0 7	0 2 0	0 2 0	£12 to £15	0 14 0
Colesberg ...	0 9 0	...	0 10 6	0 7 6	...	0 6 0	...	...	0 14 0	...	..	...	0 1 6	0 3 0	...	...
Cradock ..	...	..	...	...	..	...	..	...	0 16 0	...	0 0 8	0 0 8	0 1 2	0 3 3	...	...
Dordrecht ...	0 9 0	0 18 0	0 17 6	0 11 0	...	0 10 0	..	0 8 6	0 17 6	0 1 8	0 0 9	0 0 8½	0 2 0	0 4 8	£18 to £20	1 0 0
East London ...	0 11 6	0 17 3	0 11 6	0 10 9	0 10 0	0 15 9	0 18 3	0 12 9	0 18 0	0 1 6	0 1 0	0 1 0	0 2 9	0 4 0	..	...
Graaff-Reinet ...	0 12 3	...	0 12 6	0 11 9	...	0 11 0	0 12 0	..	0 13 6	0 0 6	0 0 7	0 0 7	0 1 4½	0 2 0	£11 18 to £13 10 -	20/- to 22/6
Graham's Town ...	0 10 0	...	..	0 12 3	...	0 7 9	...	0 7 6	0 15 3	0 1 2½	0 0 8	0 0 9	0 1 6½	0 3 11	...	...
Kimberley ...	0 13 0	0 17 0	0 14 0	0 12 6	0 12 0	0 12 6	0 15 0	0 14 6	1 2 0	0 1 0	0 1 2	0 0 10	0 2 3	0 3 6	£12 to £18	20/- to 25/-
King Wm's Town	0 11 6	0 6 0	0 13 0	0 9 6	0 10 3	0 19 6	0 12 6	0 7 3	0 13 3	0 1 0	0 0 7	0 0 9	0 1 6	0 2 10	£16 to £24 10/-	17/6 to 38/-
Malmesbury ...	0 10 0	0 13 0	0 12 0	0 11 0	...	0 9 6	0 9 0	0 9 6	1 0 0	0 1 9	0 0 8	0 0 7	0 1 9	0 2 0	£16 10/-	25/6

CURRENT RATES OF AGRICULTURAL PRODUCE—(*continued*).

CENTRE.	A. Wheat per 100 lb.	B. Wheat Flour per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal. per 100 lb.	F. Barley per 100 lb.	G. Oats per 100 lb.	H. Oat-hay per 100 lb.	J Potatoes per bag.	K. Tobacco (Boer Roll.) per lb.	L. Beef per lb.	M. Mutton per lb.	N. Fresh Butter per lb.	O Eggs per doz.	P Cattle, Slaughter.	Q. Sheep, Slaughter
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Mossel Bay ...	0 12 0	0 14 0	0 13 0	0 9 0	...	0 6 0	0 16 0	0 7 6	0 15 0	0 1 0	0 0 9	0 0 9	0 1 6	0 1 6	...	...
Pietermaritzburg Natal	..	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...
Port Alfred	...	...	...	...	...	0 9 0	...	...	0 9 0	...	...	...	0 2 0	0 3 7	...	..
Port Elizabeth ...	...	...	...	0 10 0	...	0 6 6	...	...	0 17 0	...	...	...	0 1 6	...	..	..
Queen's Town ...	0 10 6	0 16 0	0 10 0	0 9 6	0 4 0	0 9 0	0 7 0	0 7 0	0 12 6	0 2 6	0 0 8	0 0 7	0 1 6	0 3 0	...	...
Tarkastad ...	..	...	...	...	...	...	...	...	..	...	..	...	...	...	...	...
Vryburg ...	0 18 0	1 1 0	0 17 6	0 12 6	0 5 0	...	0 18 0	1 1 0	1 6 0	0 1 6	0 0 10	0 0 10	0 3 6	0 4 0	...	...
Worcester ...	0 11 3	0 15 0	0 12 0	0 10 0	0 11 0	0 8 6	0 16 0	0 7 0	0 16 6	0 0 8	0 0 8	0 0 8	0 1 9	0 2 3	12 0 0	1 7 0

NOTE.—Returns have not been received from the Civil Commissioners of Aliwal North, Pietermaritzburg and Tarkastad.

THE

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EDITORIAL NOTES.

We read in the *Field* that Sir W. F. Haynes Smith, High Commissioner of Cyprus, in an official communication to the Colonial Secretary, mentions that continued encouragement is being given to improve the breed of horses, cattle and donkeys in that island. The annual shows and prizes at the principal country fairs are vincing the peasantry that it is worth their while to take care of to properly feed their young stock. "The most convincing argument, however, has been that the price of donkeys is rising, and in a few years the Cyprus donkey may be made the finest donkey stock of the world."

The article on the ravages of prickly pear in Queensland will show how extensively this scourge has overrun the land. Says a Texas stock journal:—"A reward of £5,000 has been offered by the Department of Agriculture of Queensland for the discovery of a method for the eradication of the prickly pear in that country. Here is a chance for a Texas cattleman with a lot of hungry steers and a pear burner."

But the writer of the article does not favour the use of prickly pear as fodder for stock, for reasons which he assigns.

No Government is so liberal in the free distribution of seeds as that of the United States of America. Each Congressman exercises his privilege of small patronage. A recent report from Washington says that the largest seed distribution ever made by the Government began on Dec. 2. Congressmen will distribute 38,300,384 packages, against 28,000,000 last year. Besides, the Department of Agriculture will send out 750,000 packages of flower and vegetable seeds to its crop correspondents, and 800,000 packages will be distributed through State Grange organizations; experiment stations, weather bureau observers, etc., will also be supplied. Last year the seeds cost £170,000 and weighed 560 tons; this year they cost £230,000 and will weigh twice as much, or over 1,100 tons. Each Congressman gets 50 trees to dispose of, of different varieties, suited to the section he represents, and he distributes 5,665 packages of seeds altogether. In rural districts they are easily disposed of, perhaps, but in urban districts they become a drug.

It is very satisfactory to note that the Governor-General of Madagascar is arranging to have all breeding cattle submitted to the tuberculin test previous to exportation. From the information obtained from Natal, it would appear that tuberculosis is the only disease which they have discovered amongst Madagascar cattle imported into that Colony. Anthrax, although a most fatal disease, arises from local causes, and is not liable to be imported with the cattle, as any already infected animals would die within two days after their despatch. The Madagascar cattle have the further advantage that they are reported to be immune against Redwater and the Coast Gall-sickness, prevalent in this Colony and Natal.

The attention of vine growers is particularly invited to a memorandum by Mr. C. Mayer, Agricultural Assistant at Stellenbosch, on the rooting of Jacquez vines. It is pointed out that these vines root with great difficulty, and special treatment for obviating this defect is detailed.

Respecting the article on Electro-culture of Crops, we may say that experiments have been undertaken by Dr. Selim Lemström, of Helsingfors, on the uses of electricity in stimulating the growth of cereals, vegetables, and other plants. The experiments showed that for plants growing on arable land of medium quality an increase of 45 per cent. on the crops is obtainable; but the better the field is ploughed and cared for the greater will be the increase. On poor soil the effect is trifling. Certain plants, such as peas, cabbages and turnips, only lend themselves to electrical treatment after being watered. It is, however, injurious to most, if not all, plants to submit them to the influence of electricity in hot sunshine.

They have found out in Queensland, according to the *Agricultural Journal* there, that the advantages of growing budded or grafted orange trees of approved merit in the place of seedlings are shown in many ways, such as the early fruiting of the tree; its freedom from thorns; ease with which the tree can be pruned; the improved quality of the fruit, especially as regards a smaller proportion of rag and absence of seeds; the regular bearing of the trees; uniformity of shape and grade, etc.: whereas in the case of seedling trees, though they often produce fruit of high flavour and especial merit, they are usually very thorny; slow to come into bearing; irregular bearers, carrying a heavy crop one year and a small crop the next, and the fruit possesses numerous seeds and is full of rag, as well as being uneven in grade and shape. Inferior seedlings are not worth propagating, as the fruits are usually of poor flavour, have a heavy skin, and are full of rag and seeds: in brief, they are not worth cultivating, as they cannot compete in the open market against better varieties.

It is as well to notify that the Department has no more tobacco seed in store. Three varieties are under order, namely, Sumatra, Long Leaf Gooch and St. Felix. When these are received intimation will be given to subscribers through the columns of the *Journal*.

QUERIES AND REPLIES.

Vineyard Cultivator and Plough.

Will you be so good as to let me know whether the ordinary vineyard cultivator is good enough as a susbtitute for digging, and which is the best cultivator to be used in a vineyard planted 4 ft. x 4 ft. Also whether a vineyard plough can be used in this case, with equally beneficial results, or with better results, and which is the kind of plough you can recommend as best.

PAUL J. DE WET.

Zand Vliet, Ashton Station.

The ordinary vineyard cultivator, preferably the "Planet Junior," if used frequently for stirring up the soil and keeping down the weeds, takes the place of digging in vineyards. The cultivator's knowledge will tell him when it should be used.

E. P.

To Destroy Blue Gums.

I have five blue gum trees, about forty-six years old, and about 150 feet high, and 12 to 18 feet in circumference. These I want to kill, as my tobacco-drying floors are in their neighbourhood and the falling leaf is of constant annoyance. Can you please tell me the quickest and easiest way to kill them? Barking them all round has been suggested, and I have also been told of paraffine, by boring holes downwards and putting it in, but my father tells me that he has tried this on other trees, but without success, so I appeal to you for your kind advice.

C. W. LEACH.

Poplar Grove, Whittlesea.

Small trees, stumps and roots can be conveniently killed with the scrub exterminator sold by Government—Arsenite of Soda; but these big blue gums would best be killed by felling or ringing. To kill them thoroughly by ringing, a notch must be cut entirely round the circumference of the tree as far in as the heartwood. They will die quickest in the middle of summer. To avoid trouble and the danger of the trees decaying at the base and falling afterwards, it would seem preferable to fell them straight away in the ordinary manner with an axe.

E. HUTCHINS.

I would be glad to know of a remedy for getting rid of meerkats; my farm is overrun with them.

S.C.B.

Roodehoogte Station, Middelburg.

Arsenic or strychnine in food placed on their runs and protected from dogs and other animals has been found' effectual. As strychnine has a bitter taste the arsenic might be preferable.

Vines Running Down.

Will you kindly inform me the cause of vines running down, their prevention and cure. I find every year that my grapes, just when forming berries, after blossoming and some parts still in blossom, commence to fall off as soon as you touch the vine, and the result is that more than half of the berries are lost. Will the pruning have anything to do with it? I prune rather late, first week in August, just as the sap is rising; will too little water or too much do the harm at the time of blossoming? The vines get manure and are dug over every winter, and the soil is rich river deposit.

S. P. LOUW.

New Year's Kraal, Hope Town.

The dropping of berries, or running down of vines as Mr. Louw puts it, may be due to defects in the formation of the flower but as this is a rare occurrence and has, as far as I know, so far only been observed in the Colony on American vines, I feel inclined to ascribe the non-bearing of Mr. Louw's vines to excessive growth. Experience has amply proved that with age, as the vigour of vines decreases, productiveness increases, that in fact anything which tends to diminish the quantity of sap, in other words the vigour, also diminishes the tendency to non-setting of individual vines subject to that defect. I would therefore recommend to Mr. Louw:

1. To apply water sparingly, only when absolutely required, and particularly withhold it during or immediately after flowering.

2. To stop manuring for a time, and later on manure once only every three or four years.

3. To prune as late as possible, and, in case his vines are trained and pruned in the way customary to the Colony, to prune them long.

This pruning long consists inleaving the upper shoot formed from last year's wood, merely cutting it back to six or eight eyes and fastening it in a semi-circle to the opposite branch; or leaving one long shoot each on two opposite branches and twisting them together. In addition to the upper shoot, the lower shoot formed on last year's wood is cut short in the usual way for the purpose of providing pruning wood for next year's operation, as the long shoot of the previous year is then entirely removed.

C. MAYER.

AGRICULTURE.

Electro Culture of Crops.

Three years ago Mr. Martin O'Sullivan, of Athea, Co. Limerick, a postmaster with scientific leanings, astonished his neighbours by fixing up barbed wire in parallelograms by means of poles over a small patch of potatoes in his garden. That this was done to "keep away the blight" was the general impression, and it was not until October that Mr. Horan, County Surveyor, was asked to examine and compare the crop grown under these peculiar conditions with tubers raised in the ordinary way. The results were eminently satisfactory. In size and quality the potatoes protected by the barbed wire were found to be superior, and the yield was calculated to be 40 or 50 per cent. higher than that of an unprotected patch in the same garden. Little more than local attention was attracted to these tentative experiments, and the postmaster continued them on a somewhat larger scale in 1900, and with similarly satisfactory results. Last year the Department of Agriculture and Technical Instruction in Ireland took the matter up, and although no formal report has been published, it is known that the result of the experiments, carried out more scientifically than was possible in a remote hamlet, have been quite satisfactory. Mr. O'Sullivan now claims that the principle of electro-culture may be applied with advantage to all other crops. He says, speaking of his pet subject, "The experiments, two in number, carried out by the Agricultural Department last year to test my system gave good results. In one there were no potatoes diseased, and in the other the diseased tubers were only 8 per cent., while in the unprotected plot the diseased were five times as numerous. As to yield," continues the enthusiastic experimenter, "the increase in 1899 and 1901, when there was little or no blight, was about 80 per cent. In 1900, a year of severe blight, the increase of large potatoes was 300 per cent. The potato crop in 1899 and 1901 having been, as it were, raised to the level of our other crops, may I not assume—and I have not assumed anything in connection with this subject which has not been verified—that the agency of success in the protected potato plots would be equally successful with other crops? Consequently, I feel justified in claiming that the application of my system would stimulate the growth and increase the produce by 80 per cent. of corn, root and green crops, of meadowing and pasturage, of every crop—the electricity conveyed into the soil warming it, and converting into active and available form some of the dormant plant food therein contained. If the increase were shown in all crops, would not my invention greatly benefit directly the farmers, crofters, cottiers and market gardeners of the United Kingdom, and indirectly the rest of the community?"

Mr. O'Sullivan believes that if, instead of barbed wire, specially manufactured abstractors, conductors, diffusers, transmitters and radiators—of which he has given drawings to the Agricultural Department—were used, the results would be even more remarkable. He then gives elaborate directions for the arrangement of the barbed wire. His first plan is as follows: Take a square, a side of which is 48ft., divide it into nine equal squares, fix a pole, 12ft. high, 2in. by 1¼in., at every angular point, and one at the intersection of the diagonals of every square. Barbed wire to be attached to or near the top of each pole, projecting at least two clusters of points above it, stretching downwards, and having from 3ft. to 4ft. of it coiled into a ball, or, rather, into the segment of a sphere, and embedded in the furrow about 2ft. from foot of pole, so that the top of the ball, or segment, would be from 2in. to 4in., according to the stiffness or looseness of the soil, below the surface of the furrow. The poles would be 16ft. apart. Fewer poles need be used if they were higher. Mr. O'Sullivan estimates the cost of sixteen poles at 5s. 4d., and of wire for the square above-mentioned 9s. 6d., both being available with proper care for several years.

W. S. B. in the *Field*.

Prickly Pear in Queensland.

In discussing the eradication of this rapidly increasing curse of the farmer, the *Queensland Country Life* says:—

During the past few years columns have been written in our many papers in Queensland about the Prickly Pear, and many ideas have been given for its eradication, but up to the present only a very few have tackled the clearing of the plant, although it has been quietly spreading over some of our very best agricultural lands. The Government have been trying to discover some method of poisoning the plant, but it cannot be said that their efforts have been crowned with success. A pear camp was started at Westbrook, and the pear treated with arsenic, which certainly killed it, but at a cost of £4 9s.

6d. per acre, a figure quite outside the means of people who have land that is infested, and when clear only worth about £2 per acre. But the worst feature is that the poison is highly dangerous to make and use. At one time all the men were ill and they had to cease work for about three weeks. Again, it is injurious to stock, as cattle which have eaten the pear after the treatment have died.

It is a question which should be dealt with in a courageous manner, and to do this so as to save many thousands of acres of very valuable land, a sum of money should be set aside every year by the Government and spent on clearing the Crown Lands in the best districts. As soon as these lands are clear the holders of adjacent land should be compelled to clear their properties. If this matter is not soon taken in hand thousands of acres of most valuable land will be lost to this State.

Now to deal with the various systems that have been tried with a view of exterminating this pest. One is to dig up the pear by the roots and burn it. Of course this could only be done in country that is well timbered. Before the pear is dug up a stack of wood has to be built, some have been made 80 feet long by 20 feet wide and about 2 feet 6 inches deep. On this is stacked the pear to a height of 15 feet to 20 feet and then the pile is set fire to. Another method is to dig big trenches, and put the pear in and cover it with the earth that has been dug out and let it rot. Both of these methods are exceedingly expensive, but the owners consider it better to do this than lose the land altogether. Of late a good many people have gone in for poisoning with arsenic, and this, to a certain extent, has been better than the former systems, but the arsenic has proved so dangerous that many do not like using it. Two years ago the Government let an experimental contract to Messrs. Kable and Adams to clear some land at Jondaryan by a system of poisoning which they said would kill the worst pear. They started work, but found that the poison they were using was not strong enough, and after many weeks of experimenting they discovered a mixture which has given satisfaction to many residents of the Downs who have used it. The Rev. Maitland Wood, of Dalby, has also registered a chemical combination which, used in the shape of a pill, has been highly effectual in dealing with the pest. A great many contend that the prickly pear makes a good fodder for stock, but those who have tried it have found out to their cost that this is not so. Cattle who eat pear always die, as their insides soon become one mass of festers, and strangely enough once an animal takes to pear eating it will not go back to grass. This also applies to sheep, and greatest care is taken to keep them off it by those who have had experience in the matter.

It is a very debatable question as to who first introduced the pest into Queensland, but there is no doubt that it was brought from New South Wales as a garden plant, and pieces were distributed to friends. There is one area of about 1400 acres which is so thick with pear now that it would be impossible to walk through it. This patch can be traced to a single plant which was thrown out of a garden about 25 years ago because it was getting too large. Here is one very peculiar incident that is worth mentioning. A station manager noticed the way in which the pear grew, and conceived the idea of fencing in his run with it, and dividing it off into paddocks. There were 80,000 acres of beautiful freehold land divided off with lines of pear, and now nearly one-half of it is completely covered, and it will cost many thousands of pounds to clear it. One of our large financial institutions in Queensland has spent, or is spending £20,000 to clear its land.

To try and deal with the eradication of the Prickly Pear Mr. J. T. Bell, M.L.A. for Dalby, lately introduced a measure into the State Parliament. The object of the Bill is to give the land to trustworthy people, and a bonus with it, so that the people are practically paid to clear land which will eventually become their own. It was stated while the measure was before the House, that there was no money available for this purpose. It should be considered whether, it is advisable to clear the land at a given cost or let the pear spread. For instance, suppose that there is a block of land of 5,000 acres, and one thousand acres are covered with pear, it might be necessary to put aside £1,000 to clear the pest. The value of the surrounding land would increase so much that the £1,000 given with the pear land would be easily made up by the improved value of the surrounding 4,000 acres.

The Government have now offered £5,000 reward for a system of clearing or destroying the pear.

HORTICULTURE.

Practical Orchard Work at the Cape.

(*Continued from page* 629.)

The Plum.

The chief practical difficulty in the growing of plums of sorts, grown as formerly on the plum stock was the vast proportion of suckers sent out. The portion of the orchard given up to them used to become full of these waste shoots in a very few years. To avoid this result, many growers used peach stocks. It was found that only a limited number of plum sorts would thrive on that stock, and, moreover, there was always the objection that unless the ground is thoroughly drained the peach roots are apt to die off. Everybody now knows the way peach trees in heavy soils are apt to fail, though the is put down to "yellows" or anything else rather than to the want of a well aërated root-bed. Both difficulties are avoided—the former completely, the latter to some extent, by the use of the Myrobolan as a stock. It does not sucker out, and it is not so tender at the root as the peach. On the whole it may be recommended as the best general resource for average soils. At the same time in places where the soil is light and sandy, it may be advisable to use the peach for stocks, and the grower must decide on the course he takes, by observation of the growth and success of these two trees on their own roots in established orchards in the locality in which he intends to begin planting. Formerly the apricot was a favourite stock, but it is now very properly disused. It makes a very indifferent union with the plum, and when the tree has got up high enough to catch the wind it generally breaks away at the joints. But whenever the soil is retentive through a large percentage of clay, the Myrobolan will give the best results. Wickson points out the variability of success of the plum upon peach, apricot and almond, and it would appear that not only is difference of soil an element in the matter, but also there are certain plums which will not succeed upon a given stock while others answer admirably. He therefore recommends, as an all-round stock, the use of the Myrobolan (which practically places the plum upon its own roots) until such time as experiment shall have shown the special fitness of some other stock in the locality which may be in question.

It must be remembered that the plum is by no means easy to bud for graft in a very dry climate. Care must therefore be taken to schoose not only the precise season for the rising of the sap in the stock, but also to judge of the local weather which prevails at the time of taking the job in hand. Insert the buds, by preference, on the south side of the stock, work quickly, and tie somewhat more tightly than is usual with other buds.

Comparatively speaking, the plum is a very hardy tree and equable in its growth, which never reaches above a moderate height. It may therefore be permitted to run to the standard shape, if the particular variety tends that way. Most varieties will balance themselves pretty uniformly if ordinary care be taken the first year or two in shaping the head. The plum will allow of a larger number of principals to be left after the second year, and this will result in making the usual bushy or pyramidal head. The plum really requires very little pruning beyond thinning out a too crowded head, which is almost all the winter pruning that the tree will bear; in the summer a pinching back and thinning out of the laterals is recommended. The object is to produce as many as possible of the short spurs which carry the fruit. Hence such long straight laterals as may be retained must be shortened in to at least half their length, and upon them the expected spurs will begin to start ready to carry the next year's crop. At the apex of these laterals new growth will be formed in their turn, and such of these as are retained must be treated in the same way.

Perhaps the most important feature in plum growing is the production, on a commercial scale, of the dried prunes. It is probable that the output of this wholesome and excellent product will in a few years double itself again and again, while the growing of plums for market for ripe fruit will have but little significance. The best imported French prunes are made of the Prune D'Agen, Brignole or Maître Claude. But other kinds of plums are also used. The fruit is gathered when just ripe enough to come away easily, and laid without touching on frames of lath. On these it is exposed for several days to the sun until quite soft. Every example that is the least touched by insects or bruised is carefully picked out. The frames are then arranged in a slack oven, closed up, and left for twenty-four hours. The fruit is then taken out, turned and picked while the oven is being reheated to a somewhat higher degree than before. Again the fruit goes in for the same length of time, removed and examined. A third time the oven is heated, and after remaining in it for a third twenty-four hours, the fruit is finally removed and left to get quite cold. Each separate prune is then rounded up by turning the stone in the plum without breaking the skin, and pressing the two ends together with the finger and thumb. The frames carrying the manipulated fruit are now returned to the oven for an hour. On withdrawal a pan of water is set on the floor of the oven, and left for about two hours, or till the space is filled with vapour. A final stoving for twenty-four hours in this medium finishes the operation.

THE ORANGE.

If there are any fruits respecting which the Cape grower should by this time have accumulated a good working experience, they are—first, the grape, and second, the orange. It will hardly be said that the culture of the latter has been dealt with skilfully. Success and failure both seem to have come by the chances of site and soil in most instances, and there appears to have been little consideration of the requirements of the tree and careful selection of places where those conditions will be fulfilled.

Perhaps the first datum to be taken in orange culture is the character of the tree itself as compared with the average run of orchard trees, such as the apple and the pear. When experienced gardeners talk of this difference, they will tell you that citrus trees must be dealt with more or less as *hard-wooded stuff*. To them that phrase means a good deal, and implies doing many things and not doing many others, care respecting which is not so much required with soft-wooded stuff. The root-system is far more delicate and finely fibrous than in the latter. There is therefore demanded special care in the preparation of the soil and in the drainage and aëration. Perhaps this touchy, fastidious disposition reaches its climax in heaths, azaleas and rhododendrons. So short is the portion of their root-fibres that is physiologically active, that a very slight deprivation of the air they require brought about by over-watering, or a temporary lack of moisture, is enough to kill them. The gardener therefore makes his potting composts for these plants very porous by the addition of fibrous peat and sand, is extra careful to have plenty of drainage-crock, at the bottom of the pots, and to water just enough and no more at short intervals. Now the orange and the citrus tribe generally are far from being equally fanciful, but their conditions of health and longevity—so far as the roots are concerned—are precisely similar in kind to those of the above typical series of plants, and differ only in degree. Consequently citrus-culture, to be a permanent success, must be founded upon fulfilment of the natural peculiarities of the tribe. All citrus trees require certain special cares in planting from the nursery. Their roots are naturally horizontal in direction and spread near the surface, keeping to the best and most fully aërated part of the soil. It follows that in planting, the roots should be spread well out upon the bottom of a hole of proportionately large diameter, and made to radiate as equally as possible. If the locality requires that the tree be supported for the first few years because of prevailing winds, the stake, with its lower end charred to preserve it, may be driven down into the subsoil at the time of planting, and thus the operator will escape the chance of destroying a principal root-branch by forcing it in blindfold after he has covered up the roots out of sight. As these trees are liable to gumming and bark-canker at the collar if it be kept wet, it is of great importance that they be not set deeper than they had previously stood in the nursery. There will always be a little settlement after planting, because the earth employed in filling is very loose, and this sinking may be allowed for within reasonable limits.

Whatever has been said respecting the physical character of a perfect soil, viz., the loose texture of its particles admitting air throughout the mass, their surface attraction causing a water-film to envelop each without closing up the air-ways around it, and the absence of colloidal clay to interfere with capillarity, applies to the requirements of an orangery with more force than to those of an ordinary orchard. Where the owner has to complain of the gradual decay of his citrus trees, one dying out after another, there are mostly two causes at work, acting singly or together. They are—unsuitable conditions of soil and treatment, and—insect and fungous plagues.

The whole citrus tribe differs considerably from the ordinary orchard trees in their relation to the yearly output of new wood, foliage and fruit. Hence they cannot be treated in the routine methods of pruning which have been described, nor can they be shaped to the truncated cone pattern which answers so well with dwarf trees generally. It is absolutely necessary to encourage the axial growth and thus have a tree with a more or less pyramidal outline. This varies considerably by lengthening of laterals so that the pyramid may become very obtuse at the top, or the head may tend towards a globular shape. But in all cases well-grown examples keep their main axis undisturbed, and naturally resemble the style given to other trees by pruning to standards. Generally speaking, citrus trees balance their growth very evenly if they have started well and are in a suitable aspect; consequently, the pruning knife has but little call to interfere. All that is necessary is to cut out dead wood and the long ill-placed wastrels which often fill up the centre of the tree and prevent sufficient access of air and light. Whenever a cut has to be made near an inch in diameter, the edges should be carefully pared all round, so as to ensure adherence of the bark along the line of section, and the wound brushed over with a little oil-varnish or a solution of shellac in spirit. Tar should not be used, except as a matter of makeshift. Mature trees blossom and bear the fruit very near the end of the branchlets, and the next season's fruiting growths start from behind as new laterals, which overtake the previous season's bearing-twigs, just beyond them, and fruit in their turn. It is this peculiarity which produces the evenly rounded outline of a well-grown citrus tree, and also renders unnecessary the continual shortening in which is required for the peach and similar trees. In case a branch of unusual vigour should push out so as to interfere with the balance of the head, it is best to cut it well behind the average length of its neighbours, and if possible, to a shoot on the lower side. By this means the vacancy will be sooner and more regularly filled up, and the common outline restored. But let it be remembered that the citrus tribe are impatient of the knife, and that one cause of the failure of many orchards is the original mistake of setting the little nurslings too close, say twelve feet apart, when first planted, and subsequently being obliged to keep cutting at them when they mature and begin to jostle each other with a bare six feet of space left to each all round. The prophetic eye of the planter should see as in a vision what the trees will become in a dozen year's time and give them fair play and full twenty feet or more to divide between the future spread of every pair.

The ease with which some kind of an orange may be obtained by growing the seed, has, just as in the case of the peach, been the cause of the Colony being furnished to a very large extent with trees bearing indifferent fruit. Of these the most common seem to be derived from the well-known Bahia orange of Brazil. Over fifty years ago one of the patriarchs of fruit-growing at the Cape, Mr. Joachim Brehm of Uitenhage, became much dissatisfied with the low class of orange then grown in the Eastern Province, and introduced direct from Rio several young trees of the true Bahia. From these, by careful bud-propagation, large numbers of this variety were dispersed far and wide, and although the pernicious habit of allowing seedlings to fruit has deteriorated the market supply, yet this most excellent orange is in high favour and buds or grafts are readily obtainable. Other seedling sorts are rather to be referred to the large St. Michael and the Portugal orange. It would therefore appear that the Colony possessed in the first instance excellent named sorts of this delicious fruit, but by the cultural error of propagating by seed, a mongrel race has sprung up which does justice neither to the exceptionally suitable climate of the Cape nor to the possibilities of the fruit itself.

It may be worth while to quote the words of an eminent Florida grower upon this point. He says: "Do not let any man or number of men in a pomological convention induce you to establish a seedling orange grove. If you do, you will some of these fine days wake up from a Rip Van Winkle dream and find yourself as far behind the age and times as he is represented to have been. No two seedling orange trees will ever produce fruit exactly alike. Consequently your fruit will become promiscuous and variable in character and quality. You know what bad business that is. Your neighbours, who have selected known and uniform varieties, will find a more ready demand and sale at full 50 per cent. advance on what you can get for your mixed promiscuous fruit. Besides, budded trees fruit much earlier than seedlings. We choose certain standard varieties, noted for their fruitfulness and excellence, and reject all others. Then we bud on two-year-old seedling stocks, and invariably get fruit in two years. Now, seedling trees may be eight, nine, or even ten years in coming into bearing, and after all this delay one only gets 20 dollars per thousand for them, while 40 to 50 dollars per thousand come easily for our selected varieties. They are nearly twice as fruitful as the seedlings, and in some instances produce four times as much. We bud the Navel (that is the Bahia), St. Michael, the Blood Orange, and the Mandarin. The sooner your Californian fruit-growers understand this the better it will be for them."

So much for making a judicious selection of two or three sorts and growing them only. Which are these to be? And are there no nameless fruits here and there in the Colony which are good enough for the purpose?

It is perfectly true that amid the multitude of seedlings which have arisen here growers, as was to be expected, have had the luck to raise a few good sorts equal to many that are preconized and made so much of in Australia and Florida. Perhaps one in a couple of thousand may be worth perpetuating, and the lucky raisers who can bring them forward as equal to the Bahia, the Mediterranean Sweet, or the small St. Michael, and find their judgment endorsed by experienced buyers, had better at once distinguish them by a name and give them a permanent standing on the local market. But in all these cases the essential points of smoothness of skin, thinness of rind and rag, juiciness of sections and tenderness of membrane, besides the sweet liveliness of flavour that goes to a good orange, must be present. Otherwise it would be far better to let the seedling be lost in the crowd.

(*To be continued.*)

VETERINARY.

Malignant Jaundice of the Dog.

This disease, variously named malarial fever, malignant malarial jaundice, and by some dog-owners simply distemper, is one of the most fatal diseases of the dog met with in Cape Colony.

It may be roughly defined as a malarial disease affecting dogs, communicable by direct inoculation from animal to animal, but not by cohabitation or ingestion, and due to the presence of a hæmatozoon in the red blood corpuscles.

The disease attacks Cape bred and imported dogs indiscriminately, is confined to certain parts of the country, and is most prevalent in the summer and autumn.

Judging by contemporary literature on the subject, there can be no doubt that this disease is met with affecting dogs in other countries. Celli, in his work on "Malaria," alludes to Pointer dogs brought from Lombardy to the Compagna marshes contracting a form of malaria, and mentions the presence of an intracorpuscular body in the red blood corpuscles. In 1890 Piana and Galli Valerio pointed out in the blood of the dog in Italy an intraglobular hæmatozoon resembling in form the pyrosoma bigeminum of Smith and Kilborn. At the Société de Biologie, 20th January, 1900, M. P. Leblanc of Lyons Veterinary College evidently describes a case of this disease under the heading "Nature of Infective Icterus in the Dog," as he alludes to a hæmatozoon analogous to that found in redwater in the ox. Professor Koch has seen the double pyrosoma in the blood of dogs in East Africa, and Dr. Marshon verified its existence in Senegal in the blood of eleven dogs. Lastly, in the *Recueil de Médécine Vétérinaire* (reprinted in the *Veterinary Journal*, 1901) Messrs. Nocard and Almy in France describe a case which in clinical history, symptoms and microscopical appearance of the blood, resembles a description of a good case of malignant jaundice of the dog in Cape Colony.

Symptoms.—In a case produced by subcutaneous inoculation of a healthy animal with infective material, the temperature rises on the third day, and death supervenes on the twelfth or thirteenth. If, on the other hand, the inoculation is intravenous, the initial rise of temperature occurs on the third day, but death takes place much sooner—from the eighth to the ninth day, or even earlier.

The first clinical symptoms are noticed on the third day after inoculation; the dog is dull, listless, drowsy, refuses food, and may be thirsty. On the fourth day in a case of intravenous inoculation you see the biliary staining of the visible mucous membranes commencing, just a faint dirty-yellow being noticeable. During the following day the characteristic hæmoglobinuria may make its appearance, the urine being in many cases as dark as claret. All the visible mucous membranes are of an almost chrome-yellow colour, and any naked skin, such as flanks, prepuce, inner edge of ears, etc., shares in the staining. The animal lies perfectly helpless; the whole body exhales a foul odour, constipation is commonly present, the tongue is foul and furred, the teeth dirty, and there may be shedding of part of the gums down to the alveoli. The animal in most cases appears to die from collapse and weakness, due to the drain upon the blood produced by the hæmoglobinuria. That this is not *always* the cause of death I am sure. Just as in Texas fever (or redwater as it is called in Cape Colony) one may get an animal dying with all the symptoms of that disease except the hæmoglobinuria, and find the typical pyrosoma in the blood, so one can get a dog with all the other symptoms of malignant jaundice except hæmoglobinuria, and, as in the case of the ox, recover the special pyrosoma from the blood.

If the case of jaundice has been produced by subcutaneous injection the course of the disease is slower, but the termination and the general train of symptoms are the same.

Post-mortem Appearances.—I take two cases at random from the *post-mortem* book.

Case I. 20th October.—Subject—A small smooth-haired fox-terrier dog; died during night; inoculated on the 13th inst. with 5 cc. blood intravenously from a case of naturally contracted disease in a collie. Body emaciated, weight 10lbs. 4 ozs.; eyes sunk in the head; visible mucous membranes and bare places on the body, such as the prepuce, flanks, etc., of a dirty-yellow colour; tongue heavily furred; teeth covered with dirty yellowish-brown deposit, possessing a most fœtid odour; subcutaneous fat, subcutaneous connective-tissue, and superficial muscular tissue stained yellow; intraperitioneal fat ditto; heart shows petechiæ on epicardium and endocardium; liver much enlarged, friable, yellowish-red in colour, weight 310 grammes; spleen very much enlarged and distended, pulp much softer and darker than normal, weight 61 grammes; stomach quite empty, congested at fundus, mucous membrane generally bile-stained; small intestines bile-stained; large intestines inflamed throughout, with copious exudate of a rusty-red colour on the mucous membrane, no ulcers visible; kidneys externally bile-stained, and on section paler than normal in the cortex; bladder contained about 50 cc. of dark claret-coloured urine, with fœtid odour. Microscopically the blood and spleen showed the presence of the characteristic pyrosoma.

Case II. 16th October.—Subject—A small, smooth-haired, fox-terrier dog. This was a case of natural infection, first noticed sick on 17th October, was not treated during the course of the disease, and died on the morning of 17th October. Body in good condition, weight 10 lb.; all visible mucous membranes and skin of belly stained yellow; subcutaneous tissues and fat of a bright yellow colour; heart normal; liver much congested and enlarged, more friable and darker in colour than normal; spleen much enlarged and softened; stomach had mucous membrane congested, and contained about an ounce of a dark coffee-coloured liquid; small intestines normal; the large contained slightly brown or rust-coloured mucus; no ulcers anywhere; kidneys normal; bladder full of claret-coloured urine. Microscopically the blood showed the presence of a double pyrosoma in the red corpuscles.

From a study of the *post-mortem* records of these two cases, one naturally infected, the other produced by inoculation with infective material, it will be seen that the *post-mortem* appearances in the two cases were very similar. The most striking features in the *post-mortems* I have made are, the deep bile-staining of skin and mucous membrane, the enormous increase in size of the spleen, the blood-coloured urine, and the peculiar odour evolved from a living or freshly killed dog badly affected with the disease. The increase in size of the spleen is perhaps the most marked *post-mortem* lesion.

Causal Parasite.—This is without doubt a double pyrosoma, with, in the complete stage, the thin ends approximated, and resembling in its general appearances the pyrosoma bigeminum of Texas fever. This pyrosoma in the dog was first demonstrated in South Africa by Dr. Carrington Purvis, at the Bacteriological Institute, Grahamstown. A few months previous* Mr. Spreull, M.R.C.V.S., one of the Government veterinary surgeons, had proved the inoculability of the disease. He says, "Intravenous inoculation I found produced acute symptoms in about four days, and death about the sixth; subcutaneous inoculation, on the other hand, was much slower, death occurring from the eleventh to the thirteenth day, after two or three days' illness." Since then I have made extensive inoculation experiments and *post-mortem* examinations in connection with the disease. On one occasion I obtained blood from a sick dog, and kept up the disease through thirteen animals, every one of which succumbed.

I find the intracorpuscular bodies mentioned by Dr. Purvis to be present in every case of the disease met with. The blood is infective on the third day, and they make their appearance in the red corpuscles on the fourth day after subcutaneous inoculation with virulent blood. I have also found the pyrosomata free from the corpuscles in a very advanced stage of the disease.

The pyrosomata are met with in smears from liver and spleen, and the latter organ in a fatal case positively swarms with them, one corpuscle having as many as five or six bodies in its interior.

Though in many ways strongly resembling the pyrosoma bigeminum of Texas fever, the intracorpuscular bodies in malarial jaundice in the dog present certain well-marked differences. They are larger, and not so markedly pyriform as the Texas fever parasite, and present somewhat of an oat shape, staining slightly in the centre, which possesses one clear spot, and more deeply at two or three places in the margin. This parasite stains well by carbol thionin blue, methylene blue, and the double stains of Plehn and Czinz-is-kis, but does not take up the hæmatoxylin when using Cole's method of

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*Vide *Agricultural Journal*, vol. xv. p. 588.

eosin and hæmatoxylin. It is found in sections of tissues, and blocking the capillaries in the brain. In some cases single bodies in a corpuscle may be met with, and I do not think they appeared only when the blood was examined in the early stage of the disease, as I have single pyrosomata in specimens taken at *post-mortems*. Using the blood of a case which showed the pyrosoma microscopically, I was unable to infect the horse, sheep, ox, cat, fowl, guinea-pig, rabbit, rat, or mouse.

Therapeutic Remedies.—While keeping up the strain of blood for inoculation experiments, I had an opportunity of trying therapeutic remedies, with marked ill success, but I do think the disease was aggravated, and rendered more virulent, by passage through dogs. All sorts of remedies likely to have a beneficial effect were tried—quinine, calomel, ammon chlor, ext. belladonæ, carbolic acid, benzoate of soda, alone and in combinations, without very satisfactory results. I certainly think carbolic acid hastened death. The treatment giving best results was a calomel pill to start with, then a calomel and quinine pill four times a day (the calomel must be given in very large doses). Good nursing and careful diet are, of course, essential to a satisfactory termination of the illness.

Means of Infection.—Having settled the causal parasite of this disease, one naturally next desires to find out the bearer of this cause of infection. At present we have only the history of cases of natural infection and the analogy of the spread of another disease associated with a pyrosoma to guide us to any decision in the matter; and, judging from the history of many cases of malignant jaundice, I feel little doubt that the infection in this disease can also be conveyed by ticks. I will give a couple of cases of natural infection, as sort of circumstantial evidence.

CASE I. Subject—A small rough-haired mongrel dog, kept for the past two months in close confinement in a glass case, and used by Mr. Chas. Lounsbury, the Government Entomologist, as a host for rearing certain ticks from various domesticated animals.

This dog became ill, and presented all the symptoms of malignant jaundice, with pigmentation of visible mucous membranes, and presence of pyrosomata in the blood. The dog eventually died, and the *post-mortem* appearances, macroscopical and microscopical, were typical of a case of that disease.

Mr. Lounsbury tells me that some time before the dog fell sick he obtained from some dogs in the neighbourhood of Cape Town (which dogs were said to be salted or immune to malarial jaundice) a few dog ticks, and at the same place and time secured one tick from an animal affected with the disease. These ticks were hatched out in a Laboratory; during the process the tick from the sick dog got mixed with the larval ticks placed for the purpose of feeding upon the rough-haired dog in the case. I feel certain that larvæ of the tick from the dog suffering from malignant jaundice got mixed with the larvæ of the salted ticks and so produced the disease, as we know larvæ from ticks off salted animals will not do so.

CASE II. Subject—A small aged Pointer dog, the property of a gentleman in the suburbs, who had kept this dog at his house for some two years.

History.—This dog, which, by the way, the owner said had had this sickness before, was taken on a shooting trip to Kuils River, a very bad tick veldt, ten days before, returned with ticks on him; was first noticed sick three days ago, and had rapidly got worse.

When I saw the animal it was lying prostrate, unable to stand or move. Mucous membranes of eyes and mouth, the naked skin of the flanks, even the internal surface of the ears were stained a deep dirty yellow, and there was a drop of dark blood-coloured urine on the tip of the prepuce. The teeth were covered with sordes and the tongue with a thick yellowish-green fur; the mouth had a most disagreeable odour.

I took blood from the jugular vein, and this under the microscope proved a most curious specimen, as coverglass after coverglass was examined without finding a complete red corpuscle, but every field teemed with pyrosomata free, some lying with their thin ends approximated, as seen in the red corpuscles, while others appeared singly or in groups of three or four. I stained with Plehn's and eosin, then methylene blue, and in all the covers not a single red corpuscle took the eosin stain, all that remained of them beingsome granular debris.

The dog lived twenty-seven hours after the abstraction of this sample of blood.

The inference I drew from the above case was as follows:—

The neighbourhood of the dog's home is not a tick veldt, and the animal is taken to a tick veldt, and to a neighbourhood where malignant jaundice is known to exist, returns with tick attached to his skin, and shortly after succumbs to this disease. These facts being so, I do not think that it is too much to say that the dog contracted the disease from the ticks at Kuils River.

In conclusion, I should like to point out that I have seen cases of jaundice affecting dogs in England in which the mucous membranes and even the skin showed bile-staining, and I think it would be worth while for some of the members of our profession to make and examine a few coverslips of blood from the next case they meet.

I have attached to these notes four temperature charts, showing the characteristic temperature curve in this disease, whether produced by subcutaneous or intravenous infection. It will be noticed that the curve in a dog infected from a case of natural infection is the same as when the infecting material is taken from an artificially produced case.

THE PART PLAYED BY THE DOG TICK *Hæmaphysalis Leachi*, AS A CARRIER OF INFECTION IN MALIGNANT JAUNDICE OF THE DOG.

The fact that certain external parasites can and do carry infection from a sick to a healthy animal is, I think, acknowledged by most authorities. Smith and Kilborn have shown that the progency of ticks

(*Rhipicephalus annulatus*) Say act as carriers in the case of Texas fever or redwater in cattle. The value of such knowledge is apparent, as by its use we are able to minimise the spread of such diseases, *e.g.*, we spray cattle to kill ticks before changing pasture, and prevent them carrying Texas fever to a clean area, and cover the pools with kerosene to destroy the young of the malaria-bearing mosquito.

The following experiments, conducted by Mr. Charles Lounsbury, Government Entomologist, and myself, throw some light upon the dog tick as a carrier of infection in the disease known in this country as malignant jaundice of the dog. I have previously mentioned two cases of malignant jaundice, and the chain of evidence which prompted me to state that I considered the dog tick to be capable of conveying the contagion of that disease. It will now be seen from the experiments detailed below that artificially hatched ticks, the progeny of females matured on affected animals, can produce the disease in healthy dogs; but only when they reach the adult stage.

From specimens submitted to him, Professor G. Neumann, of the Veterinary School, Toulouse, identified the South African dog tick as *Hæmaphysalis Leachi*; it was this tick which we used.

The brood ticks from which the eggs, and later the young ticks employed in the following experiments, were obtained, came from a naturally infected dog—a mongrel, alluded to in the previous notes, and quoted as a case in support of the tick-borne theory of the disease. These ticks laid eggs, which were hatched out on moist sand in an incubator. The dogs used for the first experiment were two fox-terrier puppies, which from birth, and till the termination of the experiment, were kept in such isolation as to preclude the chance of natural infection. When ten days old, the dogs were placed under observation; temperatures were normal, and no parasites could be found in the blood. When about a month old, on 15th and 20th June, both puppies were infested with larval (newly hatched) ticks. The temperatures were now regularly taken, and the blood examined at frequent intervals, but no fever manifested itself, and no parasites could be found in the blood.

In July the same dogs were again infested with a batch of the same ticks, which had moulted and entered the nymph stage; again no result followed. On 27th August the same dogs were infested with a batch of the same ticks as before, but now in the adult stage. The dogs began to look sick on 9th September, temperature rose to 105°, and on examination of blood films the red corpuscles teemed with parasites, some corpuscles containing as many as eight of the pear-shaped forms. These intracorpuscular bodies varied in shape, some being spherical or ring shaped, with a darkly-staining wall, and some thickening of this, or condensation of protoplasm, at opposite sides of the circle; others were typical pyrosomata, two being the most frequent number noticed, but one, and up to eight, were also found in a single red corpuscle. Some parasites were found free outside the blood corpuscles, both spherical and pyriform in shape, and even clove-like, that is, the thickened portion becoming suddenly thinner, instead of tapering like an oat seed. Some of the intracorpuscular spherical forms, which had a deeply-stained portion at either side of their periphery, seemed to have a fine partition dividing them in two. The puppies died on the 14th and 15th days, respectively, after infection with the young fully-formed ticks.

Post-mortem appearances were those of typical malignant jaundice. Liver much enlarged and congested; spleen large, very soft, and dark in colour; blood thin, coagulating imperfectly; a few soft clots in the right ventricle, veins empty; subcutaneous tissues and peritoneal fat bile-stained; urine colour of claret and water; kidneys enlarged, pink in colour, rather firm, and on section glistening like paraffine wax.

I am certain:—

(1). That the dog from which the brood female ticks were taken in the first instance was suffering from the disease, as the microscopical examination of the blood during life showed numerous intracorpuscular bodies, and a *post-mortem* examination confirmed the diagnosis.

(2). That the hatched-out progeny from these brood ticks produced malignant jaundice in the two puppies, from which disease they died.

Why the puppies did not contract the disease when infected with the ticks in larval or nymph stages admits of two explanations:—either (*a*) very young dogs may be naturally immune, up to a certain stage, or (*b*) very young ticks from infected brood females are unable to produce the disease. To ascertain which was the correct explanation, I performed the two following experiments:—

(1). One of the sick puppies was bled at the height of the disease (temp. 105° F. and many parasites in the blood), and 3 c.c. was injected into the jugular vein of a healthy twelve-months-old dog on 9th September. Intracorpuscular bodies appeared in the blood on the 11th; on the 15th the temperature rose to 105° F., and the animal died from malignant jaundice on the 18th.

(2). A puppy fourteen days old (one of eight), sucking its mother, was also inoculated with a minute dose of the same blood on 9th September. Intracorpuscular bodies appeared in its blood on 14th September, temperature 103·2°, and death from malignant jaundice took place on 20th September.

The blood of both animals was examined previous to inoculation, and found to be free from pyrosomata.

As confirmatory evidence that dog ticks, the progeny of infected females, can only convey the disease during the adult stage of their growth; a second series of experiments was undertaken. Dogs Nos. 5, 6, 7 and 8 were selected, and kept under such circumstances that natural infection was an impossibility; for some time previous to infesting them with ticks their temperatures were carefully registered and their blood frequently examined.

Dogs Nos. 5 and 7 were infested with larval ticks, the progeny of infected females. The temperatures were taken regularly, and no rise was noticed; films of their blood were taken at frequent intervals, and no parasites could be seen. These two dogs are alive and well at time of writing.

Dogs Nos. 6 and 8 (a puppy and a full-grown dog respectively) were infested with ticks in the adult stage, the progeny of infected females, on 23rd September. On the 4th October the temperature of No. 8 was noticed to be above normal. Films from the blood were at once examined, and the causal parasite of malignant jaundice found to be present in the red corpuscles. On 5th October the temperature of dog No. 6 showed a rise, and microscopical examination of the blood revealed the presence of the typical parasite.

That artificially-hatched adult ticks, the progeny of infected females, can produce this disease in healthy animals, I think must be admitted.

Age does not appear to give any protection from this disease, as in previous experiments I have been able to produce it by subcutaneous and intravenous inoculation in dogs of all ages, and with the utmost certainty.

In conclusion, it may be added that large quantities of dog's blood, containing the parasites in large numbers, have been injected intraperitoneally into guinea-pigs, pigeons, etc., without producing death or even any lasting constitutional disturbance. This experiment was undertaken to ascertain if the parasite of malignant jaundice in the dog produced the caustic and irritant effects said to follow an intraperitoneal injection of Texas-fever blood, as stated by M. Lignière in his report on that disease in Argentina.

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Further Notes on Malignant Jaundice in the Dog.

It has been demonstrated how the injection of blood containing the *Piroplasma canis* (Laveran) into a healthy dog is followed in the great majority of cases by death after a longer or shorter period (which varies in certain cases with the quantity of infecting matter used). This being the case it was some time before a salted dog could be obtained to carry on the experiments, so many of the subjects practically recovering from jaundice to die of anæmia and prostration long after all the clinical symptoms of the disease had disappeared.

A salted dog No. 11 was at last obtained from Constantia (a notorious place for this affection of the dog); this animal had had an attack of malignant jaundice and recovered.

This dog was received on Nov. 4th, 1901, and its blood most carefully examined; and although many scores of covers were prepared and searched over by myself and other microscopists we were, and I may say are, still unable to find a single trace of any parasite in the blood.

No. 1 *Experiment.*—On the 16th Nov. this dog was bled and 6 c.c. of the blood injected subcutaneously into dog No. 10. As can be seen by reference to the chart of this dog,* the animal was kept under observation long enough to preclude any chance infection being the cause of death from malignant jaundice. In eight days the characteristic pyriform intracorpuscular bodies were noticed in the blood, on the morning of the 12th, the clinical symptom of blood-stained urine appearing on the 13th, and death supervening on the morning of the following day. The result of this experiment showed that though we were unable to distinguish any bodies in the blood of a dog recovered from malignant jaundice, yet that blood remains infective for a considerable time after; the dog No. 11 having had the disease in the latter half of Oct. With a view to discovering how long the blood of such an animal remained virulent the following experiments were conducted.

No. 2 *Experiment.*—The salted dog No. 11 was bled on the dates mentioned in the following sets of experiments.

On Nov. 17 dog No. 9 received 4 c.c. salted blood and died on Dec. 4th with all the symptoms and *post-mortem* lesions of malignant jaundice.

No. 3 *Experiment.*—On Nov. 26 dog No. 13 received 4 c.c. of fresh salted dog's blood, death occurred on Dec. 4th; this was a short and sharp case. Symptoms were marked lesions on *post-mortem* typical, and urine blood-coloured.

No. 4 *Experiment.*—On Dec. 3rd dog No. 12 received 2 c.c. of fresh salted dog's blood and died from malignant jaundice on the 22nd of the same month.

No. 5 *Experiment.*—On December 17th, Dog No. 5 received 6 c.c. of salted dog's blood and died from malignant jaundice during the night of the 30th.

No. 6 *Experiment.*—On January 6th, 1902, Dog No. 17 received 7 c.c. of the salted blood. This animal, as can be seen on reference to the chart, lived many weeks and finally died from debility; on *post-mortem* the spleen and liver were both enlarged but not extremely so, lungs normal, a few ounces of pus in the pleural cavity.

Blood films were taken from this case on the day of inoculation, January 6th, and daily until February 9th, and again on the 12th and 17th; these films are being examined with a view to discovering something about the life history of the parasite.

No. 7 *Experiment.*—On January 24th, 1902, Dog No. 7 (which had been under observation since September 15th, 1901, received 5 c.c. of the salted dog's blood and died from malignant jaundice on 8th February.

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*The charts could not be conveniently included.—Ed.

No. 8 Experiment.—On February 3rd, Dog No. 14 received 6 c.c. of salted dog's blood and death occurred from malignant jaundice on the 21st February.

No. 9 Experiment.—On February 25th, Dog No. 23 received 20 c.c. of the salted dog's blood in three places and death occurred from malignant jaundice on March 5th; this was a very quick and severe case.

Post-mortem: spleen normal, liver much enlarged, kidney very dark in centre, urine blood-coloured, blood swarming with pyrosoma.

No. 10 Experiment.—On February 27th, Dog No. 16 received 27 c.c. of fresh salted dog's blood, subcutaneously; this animal was a small mongrel under observation since January 1st, weight under 4 lb.

The nett dose of blood was 27 c.c., the gross amount 37 c.c.; this animal died from shock on the third day after. *Post-mortem* showed spleen normal, no pyrosoma in blood or elsewhere, extraneous organisms in liver and blood; lungs showed patches of pneumonia.

No. 11 Experiment.—On March 13th, Dog No. 25 received 2 c.c. of salted dog's blood (No. 11) and died on April 16th.

As can be seen from the chart this was a long-drawn-out case; bodies appeared in the blood on March 28th. I give this *post-mortem* more fully than that of the preceding dogs as this was a good example of what I alluded to at the commencement of these notes, viz., certain animals practically recovering from the disease and dying of anæmia.

Subject:—A medium-sized Fox Terrier Bitch.

External appearances:—Extreme pallor of all visible mucous membranes and naked skin of flanks and genitals, pads of feet quite white and body much emaciated; weight 6 lb.

Scarcely any blood in the body, vessels filled with pale semi-clotted blood, a little clear fluid in pleural and peritoneal cavities.

Liver enormously enlarged, soft, and distended with watery fluid; weight 10 oz. Spleen slightly enlarged, soft, and pale in colour; quite bloodless; all the organs when cut and smeared on white paper scarcely left any stain. Kidneys pale and friable, urine normal, and the causal parasite present in smears from spleen and heart.

There was an entire absence of any of the *post-mortem* appearances met with in dogs dying in the acute form of the disease.

Summary.—As can be gathered by perusal of these eleven experiments and study of their attached charts, the blood of a dog recovered from malignant jaundice can convey the disease by inoculation from November 4th, 1901, to April 15th, 1902, yet although all manners and methods of preparing and fixing the blood films have been tried, and all varieties of stains employed up to date, it has not been possible to demonstrate in this salted animal's blood the typical pyriform intracorpuscular body (or any of its modifications) usually associated with malignant jaundice in the dog.

In the preceding experiments only *one* salted dog was employed, viz., No. 11, the blood was injected into the clean dog immediately on withdrawal from No. 11, the dose of blood given on charts was the *nett* amount of salted blood, the inoculations were all performed subcutaneously, the subjects were dogs from the dog pound and their diet biscuit and milk.

In tapping the salted dog so often one had to employ care in order to avoid obliteration of the jugular vein. I generally employ for the purpose of collecting blood a sterile 10 c.c. hypodermic syringe with a medium needle, and rinse out the instrument with a sterile watery solution of citrate of potash.

I have tried many and varied methods of preserving the virulence of blood (from a case of malignant jaundice) outside the body, so far without success, and I find that a very small dose of virulent blood either produces an attack of the disease generally ending fatally, or does not disturb the animal's constitution in the slightest, but does not confer any immunity.

W. Robertson, M.R.C.V.S.,
Government Veterinary Surgeon.

STOCK FARMING.

Cattle Disease in Madagascar.

In connection with the importation into South Africa of cattle from Madagascar, the following interesting correspondence and reports on the subject are published for the information of our readers:—

Downing Street,
14th November, 1901.

Sir,—

I have the honour to transmit to you for the information of your Ministers, the papers noted in the subjoined schedule.

I have, etc.,
(Sgd.) J. Chamberlain.

The Officer Administering the Government
of the Cape of Good Hope.

Date.	From	To	Subject
1901. 4th November.	Foreign Office.	Colonial Office.	Cattle Disease in Madagascar.

Consul Porter No. 5. Coml.

Mr. Sauzier No. 4. Coml.

Consul Porter No. 6. Coml.

The Under Secretary of State for Foreign Affairs presents his compliments to the Under Secretary of State for the Colonies, and is directed by the Secretary of State for Foreign Affairs to transmit to him, to be laid before the Secretary of State for the Colonies, the accompanying papers noted in the margin, respecting Cattle Disease in Madagascar.

(Sent also to the Board of Agriculture.)

Foreign Office,
4th November, 1901.

No. 5
COMMERCIAL.

British Consulate, Antananarivo,
September 13th, 1901.

MY LORD,—

I have the honour to report that during the past two months there has been considerable mortality amongst cattle in parts of this district.

2. The information which I am at present able to obtain on this subject is unfortunately imperfect, offering no precise indication as to the extent or cause of the mortality. The origin and nature of the diseases which have resulted in these deaths are being made the subject of an investigation by the Coloniel veterinary authorities, on completion of which I hope to be able to report to Your Lordship more definitely.

3. An outbreak of cattle sickness appeared during the latter part of July in the region of Marovoay (district of Majunge), in the north-west of the Island. The naturo of the disease is not yet known. The mortality was strictly confined to the neighbourhood of Marovoay. The last fatal case occurred on August 7th, and by the 26th of that month all traces of the malady had disappeared from that locality.

4. Several deaths are also reported to have taken place during the past month amongst the draught oxen of a French colonist residing about 30 miles from this town. The disease in this instance appears to have been "anthrax."

5. No official report has been published as to the existence of cattle disease in Madagascar, and the French authorities attach very little importance to the few local cases that have made their appearance.

I have, etc.,

(Sgd.) T. P. PORTER,
His Majesty's Consul.

The Marquis of Lansdowne, K.G., &c., &c., &c.

No. 4
COMMERCIAL.

British Consulate, Tamatave,
3rd October, 1901.

MY LORD,—

I have the honour to report that a cattle disease which the veterinary authorities have declared to be "tuberculose," or what is known in English as "Black lung-sickness," has lately appeared in the province of "Farafangana" on the south-east coast at about 200 miles from this, and that a considerable number of cattle have died from it but I am informed that the mortality has greatly deminished.

The French authorities have taken immediate measures for the isolation of sick cattle or those suspected, and are of the opinion that this disease was caused by want of proper food during the dry season, by the sudden variations in the temperature and by the frequent changes of locality which the herds of cattle had to submit to very often.

On hearing of this black lung-sickness on the 27th ultimo, I at once cabled to the Governor of Natal and Mauritius reporting the matter.

I have, etc.,

(Sgd.) ANATOLE SAUZIER,
His Britannic Majesty's Consul.

His Britannic Majesty's Principal
Secretary of State for Foreign Affairs.

No. 6
COMMERCIAL.

British Consulate, Antananarivo,
27th September, 1901.

MY LORD,—

In continuation of my despatch No. 5 Commercial, of 13th inst., I have the honour to report that, in a recent shipment of cattle from a port of Tullear (South-west Madagascar) to Mozambique, several of the animals are said to have died from a disease which the Governor General informs me is known as "black lung-sickness."

His Excellency states :—"La maladie qui a décimée les boeufs de Monsieur Behir serait connue en anglais sous le nom du 'black lung-sickness.'"

I have, etc.,
(Sgd.) T. P. PORTER.

The Marquis of Lansdowne, K.G., &c., &c., &c.

His Majesty's Consulate, Antananarivo,
March 10th, 1902.

YOUR EXCELLENCY,—

Govr.-Genl. Galleini, March 8th, 1902.

In accordance with the desire expressed in your letter No. 879 of 30th December last, I have the honour to transmit for Your Excellency's information a copy of a communication from the Governor-General of Madagascar containing further particulars in respect of the nature of cattle disease existing in this colony, and indicating the measures which are being adopted to prevent its spread and development.

I have, etc.,

(Sgd.) T. P. PORTER,
H.M. Consul.

His Excellency
Hon. Sir Walter Hely-Hutchinson, G.C.M.G., &c ,
Governor of the Colony of the
Cape of Good Hope.

TRANSLATION.

Antananarivo,
8th March, 1902.

General Galleini, Commander-in-Chief of the Forces of Occupation, and Governor General of Madagascar and the dependencies thereof to His Britannic Majesty's Consul, Antananarivo.

SIR,—

In reply to your letter of the 19th February, I have the honour to inform you that the sanitary condition of the Madagascar herds should not inspire any apprehension.

For a year or two past, it is true, reports from the Heads of the administrative "Conscriptions" have described diseases raging among the cattle in different parts of the Island; these reports simply revealed a situation which has prevailed for a very long period. The extremely defective conditions under which the natives, and, unhappily, also a certain number of colonists here practice stock-breeding, the difficulties which they have experienced in securing for the cattle sufficient nourishment during the dry season, the excessive fatigue sametimes imposed on animals brought from one region to another whereof the climate and resources from the point of view of aliment completely differ, are almost the sole cause of mortality. In reality there is nothing in this situation (which the lack of veterinary surgeons and the impossibility of proceeding with serious investigations had prevented us from knowing sooner) which could alarm commercial interests, for, properly speaking, no epizoötic exists.

Recently, veterinary surgeons have been despatched on a mission to different parts of the Island, notably to Farafangana, to Ambositra and Mevetanana. This fact has sufficed to provoke a feeling which is quite unjustified. In fact, at Farafangana and at Ambositaa investigation has only revealed some isolated cases of anthrax. Tuberculosis is, as you are aware, a disease widely spread through all stock-breeding countries, and the proportions which it attains in Madagascar certainly do not exceed those to be noticed in those parts of Europe which are most distinguished for the good condition of their bovides.

The cases of anthrax, very rare as they are, are always absolutely isolated, and the malady has never assumed any contagious or epidemic character.

For the suppression of both diseases, the most stringent measures, however, have been taken. The suspected animals have been isolated, many have destroyed inoculation has already bean carried out and will continue to be employed everywhere where necessary. Thanks to these precautions, the decrease of the scourge has been manifested almost simultaneously with the first cases being ascertained.

You will therefore be in a position to acquaint His Excellency the Governor of the Cape Colony that the health of the Madagascar herds is satisfactory, and that South African breeders have nothing to fear from the importation of our oxen.

I should be obliged if you would be good enough to add that I am devoting myself to expediting the complete and final organisation of the sanitary police and the veterinary service in Madagascar. My administration at the present moment has under its consideration the establishment of a body of veterinary surgeons which will operate regularly at short notice.

In a very short time cattle will only be permitted to leave the colony after having been submitted to the inspection of an expert who will make them undergo the tuberculin test; animals absolutely free from all trace of disease will alone be exported. It is to be anticipated that under these conditions the cattle of Madagascar will not be long before they take an important position in all the markets in which they are offered.

I have, etc.,

(Sgd.) GALLEINI.

Kerry Cow Ormeau Daisy.

We take over from the *Live Stock Journal* the following remarks and accompanying illustration :—

The Kerry cow "Ormeau Daisy" was calved in 1896, and belongs to the Earl of Shaftesbury, Belfast Castle, Belfast, by whom she was exhibited at the Royal Dublin Society's Show, when she gained the first prize in her class, the Blythwood Challenge Bowl as the best Kerry or Dexter in milk, and the special prize for the best Kerry or Dexter in the show. Her shape, quality and character are very correct and pleasing, and her udder is large and well shaped.

South African Possibilities.

When the long-drawn-out struggle, writes the *Racing Calendar*, between Briton and Boer is eventually brought to a close, all the world, so to speak, will turn to South Africa as a field of enterprise. The possibilities of this country, with peace definitely assured, must be enormous. This is easily understood. Once a settlement is arrived at, either through sheer force of arms on the one side, or absolute surrender on the other, and the British flag flutters in the breeze unchallenged, it will not be long before a start is made with "putting things to rights" under wise and stable government. The devastation that has accompanied the war will leave colossal work to be done. Vast sums will have to be spent in putting matters on a proper footing again, and all trades will be materially benefited, and the money thus coming into circulation will give a great stimulus to trade. Much depends on how the Boers eventually accept their defeat. But whether the Boers decide to make the best of things, or live the lives of outlaws, the march of progress will begin once the Britisher assumes what might be called full possession.

No matter how busy the Englishman might be in dealing with the more serious side of life, he can the world over always find time for a little sport. In the present war, we are told, the English soldiers played cricket on the eve of a big battle. And, despite Kipling's recent "sermon," they fought none the less bravely the next day. With sporting instinct so strong, it is not difficult to imagine that the branches of good, healthy, outdoor amusement will get a fair chance under British control in South Africa. Nor is it going too far to say that horse racing here and elsewhere will hold the premier place in the affections of the people. There will be gathered together representatives of all nations and all creeds under the sun. But the Englishman's love for the noble thoroughbred will paramountly assert itself, and South Africa as a Turf centre should at least equal India. This, however, is bound to take time, even though the ravages of the war disappear as quickly as could be reasonably hoped.

Australians are beginning to look with expectant eyes on South Africa (says a Melbourne exchange). They, of course, want to be in the good thing too. This applies to men who affect the Turf. Arrangements have in some quarters already been made with a view to the trip, and others are in course of preparation. The spirit of enterprise thus shown is, of course, commendable. We are not so sure, however, that the time is yet ripe for such a move. A little caution may be suggested in the matter. There is already racing going on in South Africa in the more settled parts; but it is easy to see that the sport will not get anything like a fair show here until the war is brought to a satisfactory conclusion. With fighting going on, a state of unrest must prevail, and this scarcely promises well for racing, though, as before said, the Britisher will find opportunity for a little play even in the midst of his severest struggles. From what can be gathered from reliable sources, considerable risks must be accepted in going to South Africa just now. This applies more especially to the man who takes gallopers with him. Naturally the living is very costly. All sorts of fodder are high in the market, and when it comes to feeding racehorses the bill would soon run into big money, and it would not take long for a horse "to eat his head off"—to use the expressive language of the stable. Later on, when matters are more settled, competition will bring prices down, but at present they are little short of ruinous. In the near future South Africa as a horse market should be quite as useful to Australia as India has been for years past. The value of the Australian remount has already been established in the rough work of the veld, and it only requires a chance to prove the worth of the gallopers in the same climate. Our own Chesney, indeed, after shipwreck and a sojourn in England, has already exhibited in South Africa the hardihood of the average Australian thoroughbred, and we make no doubt that recent shipments will follow Chesney's lead in the new country. All this should assist to open up a trade that ought to give some much-needed encouragement to the Australian breeder, who, one way and another, rarely ever gets the reward his industry deserves. In the matter of South African trade in gallopers, Australia will go into competition mainly with England, just as is being done in India. And there need be no fear of the result. The "Waler" will hold his own under all conditions and in all countries. Studs will, of course, be ultimately formed in South Africa. But it will take years to make the local supply equal to the demand. And in the meantime the required article will have to be got outside. This gives Australia a chance, and breeders and traders scarcely want any prompting to take advantage of the opportunity.

A meeting of pastoralists was recently held in New South Wales to consider the desirability of introducing into the Colony the great South African antelope, the eland. This animal, it was said, could go for weeks without water, an instance of a herd which had not had water for four months being mentioned. Moreover, it prefers edible scrub to grass. Thus, it was urged, the eland would thrive in arid districts of Australia unfit for cattle or sheep, and its flesh was declared to be better than ordinary beef. Whether there would be a market for any large quantity of the meat is another question.

Ostrich Farming in California.

Most people have heard something of ostrich farming in South Africa, says the *Golden Penny*, but few, comparatively, know that ostriches have been imported into Southern California, and thrive well in that beautiful climate. "I was lately staying," writes our correspondent, "on an ostrich farm, owned by an Englishman, at Norwalk, Los Angeles County, California, and took some instantaneous photographs of these interesting big birds, with their 'attitudes queer and quaint,' as well as some sketches. When going among the birds it is sometimes necessary to carry a long forked stick, and if they should show fight they are literally 'choked off' by the application of the fork of the stick to their necks." An illustration shows a couple of birds fighting in the paddock, and the men rushing up with forked sticks to choke them off before they have time to injure their feathers. Their diet is varied by giving them chopped-up sugar-beets, maize and alfalfa hay, cut up and well moistened, and thus even a small farm of twenty acres, highly cultivated, can support one hundred ostriches. The first plucking, from chicks six months old, averages 17s. per bird at wholesale prices, after which the birds are plucked every seven months, the second plucking averaging £2 10s., the third and after, £4, until the birds are full grown, when the annual proceeds from the feathers of an ostrich are over £7. The infertile eggs are blown, and have a ready sale at £4 and upwards a dozen. The admission fees of visitors to the ostrich farms are also another source of profit. A duty of 25 per cent. levied on raw feathers imported into the United States gives the ostrich farmer there an additional advantage.

Angora Goats and Mohair in America.

We take over the following from the *Oregon Agriculturist*:—

Mr. G. A. Hoerle writes to the *Angora and Stockman* that, owing to the war, he has been able to buy Angora bucks and does at less than half the prices which would ordinarily be asked in South Africa. He has secured representatives of the best flocks, but will not be able to ship until he convinces the Bureau of Animal Industry of the United States Department of Agriculture that rinderpest has never been transmitted to goats. He regards the climate and soil of South Africa as unfavourable to the growth of mohair, and says that only the extraordinary efforts of the most intelligent and painstaking breeders have brought the industry to its present high state. He thinks the registry system of the South African Association too rigid. Secretary Lee informed him that of 2,000 goats presented for registration, only 140 have so far passed all three examinations, and one of the examiners informed him that it was not likely the number would be more than doubled. We believe, however, that the South African plan will prove its merits in the long run, even if, as Mr. Hoerle suggests, the present members of the Association are dead and buried before the benefits accrue.

Since our last issue was out, we have received a letter from an Angora man in New Mexico, inquiring for the address of a well-known South African breeder. This evidently implies that another man is figuring on importing Angoras from South Africa. It is very unfortunate that just at this time when fine Angoras can be bought at lower prices than usual in South Africa, and so many breeders in the United States are anxious to buy, an order should be made which prohibits their importation.

DAIRYING.

Report on Dairying Industry for Year 1901.

The following is the Report of the Dairy Expert for the year 1901:—

The year, as far as the development of Dairying is concerned, has not by any means been a favourable one, owing to the disturbed condition of the country. Most districts of the Colony having been denuded of horses, farmers living a long distance from the railway found it very difficult, and in very many cases quite impossible, to send their dairy produce to market. The climatic conditions during the winter months and early spring were very favourable, and gave every promise of a good season; but unfortunately the summer rains in the Eastern Province of the Colony were much lighter than usual, and the early promise of an increase in production was by no means fulfilled. The importance of making proper provision for dairy cattle during the winter season of the year has not up to the present received that attention from farmers which the matter demands. Individual farmers who practise winter feeding have been more than satisfied with the results. Not only do they largely increase the annual production of each cow, but they also obtain a larger percentage of increase, which is an important item in the income of a farmer in a country like this where cattle realise such good prices. It is pleasing to note that dairy farmers are gradually realising the importance of improving the milk-producing qualities of their herds. With this object in view several importations of valuable stud cattle have taken place during the year, which is a very hopeful sign, and certainly points to the fact that the farmers have every confidence in the future prospects of the Dairying industry in this Colony. No doubt when peace is again restored Dairy farming will receive a general impetus, as it offers a profitable investment for men with limited means; the returns therefrom being regular and fairly sure. At present there are a great number of farmers who are fairly large cattle breeders, but pay no attention whatever to Dairy products, being perfectly satisfied with the returns received from increase alone. This no doubt seems rather strange in a country where importations of Dairy produce take place on a large scale, and large sums of money are annually spent in buying products from other countries which, if the industry were properly developed here, could be produced within the country. It is also significant to note the attention that is being paid by other Governments to the possibilities of finding a market here for their Dairy products; and several of them have already appointed commercial agents to exploit the markets here and keep them advised as to its requirements. This fact alone should act as a stimulant to the Dairy farmers of this country, and should spur them on to renewed efforts to endeavour to maintain a large share of their own market, which I believe to be one of the best markets in the world for the produce which they have to offer for sale. Unfortunately in years gone by very few farmers looked upon Dairying as an industry, merely treating it as a detail, and never looking upon it as one of the most important branches of their calling, and, under proper management, one of the most profitable. Until this order of things has been entirely changed (a change that is gradually taking place) the Dairying industry will never receive the attention that its importance deserves.

During the year I twice visited the district of East Griqualand, which I found very well suited for carrying on Dairy farming.

The farmers in that portion of the country, owing to the long distance from railway communication, are giving their attention to the possibilities of cheese manufacture, and with that object in view a Co-operative Company was formed, and commenced operations in the spring, which are still continuing. This I hope will prove the forerunner of several similar companies, which it is quite possible to form in this favourable district. The farmers already engaged in cheese making have always found ready sale for their products at prices ranging from 10d. to 1s. per lb., a figure which has proved highly remunerative. It has been rather a difficult matter to convince the farmers of the advantages to be derived by combining, a system which has proved so successful in other Dairying countries.

By co-operation several advantages are derived. The cost of production is reduced to a minimum, and large quantities of products are manufactured of a uniform quality, thereby ensuring a more profitable market than when small lots of different qualities are offered.

The greatest drawback to rapid development in the East Griqualand and adjoining districts is the absence of railway communication; a want which is, no doubt, severely felt by Dairy farmers, and tends to counteract their other natural advantages. At the Agricultural Show held in Kokstad during the month of April, the exhibits of butter and cheese were of very good quality, and proved the possibilities of the district in this particular branch of farming.

The farmers in this particular district have been very fortunate in not having suffered any invasions by the enemy, nor the necessary restrictions of Martial Law, being entirely free to carry on their farming operations unhindered, a very distinct advantage during the year just closed.

I have found it very difficult at times to move about the country owing to its disturbed condition, and the scarcity of horses, and in some districts in which I have travelled a large number of farmers were away from their farms with the Defence Forces, and in their absence it was impossible to effect any change or improvement in their methods of dairy farming. Under the present conditions of the country no great improvement or advancement can be expected, but on the restoration of peace, which farmers are anxiously looking forward to, a decided improvement is sure to take place.

During the year I was engaged for two months on rinderpest duty, operating in the Albert and Dordrecht districts.

R. OWENS, Dairy Assistant.

VITICULTURE.

Cape Varieties of Grapes.

I have been very much interested in reading the letters of the late Mr. De Waal recently published in the *Journal* and I am very glad to be able to corroborate what he says about the identity of our Cape varieties of grapes. The grape which is grown in the Hermitage vineyards of France is the Petite Sirah and is totally different from the so-called Hermitage grown here. The true Hermitage grape rejoices in a number of synonyms. It was introduced into Australia under the name of Shiraz and into California both under the names of Sirah and Serine. Tradition has it that these names were derived from the town of Shiraz in Persia, which has for ages been famous for its wine, and that it was in this region that the grape of the Hermitage originated. The Sirah is in every way a much superior grape to the Cape Hermitage, and the recent importation by the Government of this variety will be a useful addition to our vineyards.

Mr. De Waal noted in his visit to the Bordeaux district that the grape from which the bulk of the finest Sauternes is made is identical with our green grape. The green grape which we have at Elsenburg and on the neighbouring farms which I have had the opportunity of visiting, is not one variety but a mixture of several. The farmers distinguish two varieties—the white and the pink, but besides these there is another which occurs in a small proportion· This latter grape is somewhat larger than the rest and is distinguished by a very marked and characteristic flavour. So peculiar is this flavour that to any one to whom it is familiar it suffices to distinguish the grape from any of the 5,000 odd varieties of cultivated grapes. This is the grape referred to by Mr. De Waal. Its proper name is the Semillon, and together with the Sauvignon Blanc and the Muscadelle it produces the most famous of all white wines, the Château Iquem. Doubtless it is the admixture of these Semillon grapes with our other varieties which accounts to a great extent for the excellent quality of so much of our white wine.

The identity of our White French grape with the Spanish Palomino, is I believe, unquestionable, though I do not know that the fact has ever been noted. The Spanish Sherries or wines of Xeres are made principally from this variety, and it is being planted very extensively in California for making similar wines. The Palomino in appropriate localities also makes a first class dry wine, it is an excellent table grape, and finally it is used to produce the excellent raisins of San Lucar. It is an excellent bearer and on the whole one of the best "all-round" varieties to be found. The same grape is grown in France under the name of Listan.

It is very gratifying to find that we have at least two of the best white grapes obtainable growing extensively in the Colony, but unfortunately the same cannot be said of the red grapes. What we seem to lack most is a red grape of high to medium quality and a reliable bearer; such a grape, for example, as the Carignane of Southern France, the Barbera of Northern Italy or the Jinta Valdepeñas of Spain. We have limited quantities of the Cabernet Sauvignon, and there is no grape of higher quality, but it leaves a good deal to be desired in many vineyards on the score of quantity. The three varieties mentioned above are all good to heavy bearers and make a much superior wine to the Cape Hermitage, which requires blending with a grape of high quality such as Cabernet to give good results. No more generally useful grape than the Carignane could be planted, I believe, in the extreme south-western parts of the Colony, while the Barbera is more suited to hotter and drier localities. The Valdepoñas is practically suited to producing dry red wines where the heat of the climate and the richness of the soil render the making of a wine resembling claret almost impossible from any other grape. Actual trial can alone of course determine the suitability of these varieties to our climatic, soil and market conditions, but I am persuaded by a long experience with them under very similar conditions in California that they would be more profitable varieties to grow on a large scale than the Hermitage, Cabernet or Pontac, which it appears are almost the only red wine grapes grown to any extent in the Colony.

FREDERIC J. BIOLETTI.

Elsenburg Agricultural School.

The Rooting of Jacquez Vines.

As the planting and grafting season of American vine cuttings is approaching, and as a considerable supply of Jack or Jacquez vine cuttings will be handled this season, vine-farmers and grafters are reminded that Jacquez vines root with great difficulty and a considerable percentage usually do not strike. To overcome this defect and assist root-formation, it is recommended to peel off the bark on opposite sides at the lower end of cuttings. Tests, conducted last season by Mr. P. J. Cillie, C. son, of Boven Vallei, Wellington, with grafting peeled and unpeeled Jacquez vines, show conclusively the advantage of the treatment, inasmuch as the peeled cuttings not only yielded a larger percentage of grafts but were also stronger and more vigorous vines.

C.M.

MISCELLANEOUS.

The Diet of Native Labourers.

The appended lecture on the above subject was read before the Rhodesia Scientific Association, Salisbury Branch, by Mr. Joseph M. Orpen, M.L.C., M.E.C., Surveyor-General, Administering Agricultural Department, at Salisbury, Rhodesia, 25th April, 1902:—

Lord Milner, in his despatch to Mr. Chamberlain dated 6th December last, explaining the reasons for the late proclamations with regard to labour, liquor, and other matters, mentions his reasons for temporarily prohibiting the use of Kaffir beer in towns and public diggings. He says: "Personally, I am not at all convinced that, under proper control, the use of it might not be allowed without injury, and even with advantage, to the natives." And further on he says: "When, however, we find ourselves masters of the situation, we may be able to allow the use of Kaffir beer, in moderate quantities and under proper control, in the mine compounds; although in the exceedingly well-managed Kimberley compound the natives seem to be both well and happy without it. Its use by natives in their houses the law, even as it stands, does not attempt to prevent."

In connection with the serious question thus impartially put forward, what I now wish to do is to mention the results of some enquiry, observation and thought on the wider subject of the whole diet required in order to keep native labourers in health and strength. It is a subject so large that I can only pretend to lift up a fringe of it, and promote thought, discussion and experiment. It is a subject so great that it touches the responsibility of the governing race and the "white man's burden," but it is a subject so domestic and near to us individually, that it affects us all in our very pockets. It is our own bread and butter question; none of us are unconcerned in native labour. It will be found to be a farmer's question too.

The question of the utility of beer is one part, and an important part, of this subject. With regard to that the first question is: What is Kaffir beer? And that is a question that would puzzle many to answer. It is my purpose, in the reflections which I am about to make on the subject of "diet for native labourers," to include particularly the consideration of the use of fermented food and drink by natives.

It is of the first importance that a distinction should be clearly apprehended between what the Basutos call "leting" and "joala," the fermented drinks they use. The former would be called "sweet wort" in England. It is generally used by the Basuto, and is not intoxicating. The latter is intoxicating, and is rightly called Kaffir beer.

"Joala" is generally made with the object of producing a drink of the greatest intoxicating strength attainable by native manufacture.

"Leting" is generally made with the object of producing an acidulous or acid, refreshing and nourishing drink of little or no intoxicating quality.

Between the two there are drinks of various grades of intoxicating strength manufactured. All these drinks eventually become very sour, and are drunk in that state, as well as fresh, till acidity or decomposition goes too far.

What the Basuto call "(bo) joala" the Kaffirs and Zulus call "(ubu) tjwala."

Something like "leting" is, more or less, used by other tribes. The Matabele, or Amandebele, call it "ibila."

Missionaries in Basutoland freely use and recommend "leting" while strongly opposing the use of "joala." Europeans there often use "leting."

It appears evident that the primitive beer of olden time must have been thick, and much like those present Basuto beverages, and would not keep. The Ancients had not the knowledge, means or vessels we now possess for making, clarifying and keeping beer.

When wine was used among the ancient Greeks and Romans, they put it in leathern bottles, and afterwards they used earthenware jars, and in these the wine would not keep long.

Xenophon, who lived some four centuries before the Christian era, described the Armenians as habitually drinking a fermented liquor made of barley with the malted grain in it. They sometimes stooped to drink it directly out of big pots, and sometimes they sucked it up from those pots through reeds.

Tacitus mentions beer as the usual beverage of the Germans, as it no doubt was of the nations to the north-east of the Germans. These nations still drink it. Russians to this day delight in the use of a thick, non-intoxicating, sour, fermented beverage called "quass." It is generally made from barley or rye meal, and must not be unlike "leting." Russians sometimes boil cabbage in "quass."

In the century preceding the Christian era, Julius Cæsar, during his campaigns, used to supply his soldiers with what is mentioned as "beer" and "vinegar." This he evidently did in order to keep them in health and prevent scurvy—the common scourge of armies in prolonged wars. When in Gaul, he must naturally have used the grain of that country, and the primitive methods of making beer and vinegar in use there.

In the following century, Pliny, the naturalist, wrote that all the nations of Western Europe made beer, and he mentions, as something peculiar, that the people of Spain were making a beer that would keep for some time. Probably this was like what the north-eastern Mashonas make, as I shall describe. It was, I believe, at a later period that Alexandria developed the first recorded manufacture of a keeping beer, and exported it.

In the long voyages of old times, sweet wort made from malt was very often effectively used as a drink for sailors to prevent or cure scurvy, which used to be very fatal among them before ships were, by law, required to have on board the handier drink—limejuice—as well as vegetables, etc., and particularly potatoes.

During a drought in 1851 and 1852 the troops at Bloemfontein were suffering from scurvy owing to the scarcity of juicy meat, fruit and vegetables. A military doctor prescribed for them the cheap and easily made Basuto "leting" or sweet wort, and with very beneficial results. Whether this officer intentionally followed Cæsar's lessons I do not know.

About 1862 again there was another great drought; many of the inhabitants of Bloemfontein were, from the same causes as in 1851 or 1852, attacked with scurvy, "leting" was then again prescribed with success.

Very probably its use might have prevented much of the disease which has extended during the present war among the military and in the refugee and concentration camps, which could not, owing to the devastation of the country, be well supplied with fruit and vegetables.

In about 1877 and 1878, on my arrival to survey at Griquatown, I was asked to inspect the prisoners in the gaol there, as there was no medical man within 100 miles, and the prisoners were ill, and several had died. I found them suffering mainly from scurvy, with complications, and at once recommended that Kaffir corn should be malted and "leting" given to them daily, and pending the malting, that sugar beer should be quickly made and supplied. This was done, and, with fresh air and other regimen, was successful in restoring them to health.

About that time and not long after, there was serious mortatliy in the gaol at Kimberley, especially among prisoners of war, and I have little doubt it was to a large extent from the same cause.

I suspect that some of the mortality we have sometimes heard of among labourers at mines, where they live under conditions as to diet which are abnormal, may be caused by some deficiency, not in the quantity but in the character and preparation of their food; some want which "leting" and other articles of diet might supply; something vegetable or sub-acid or which had undergone some measure of fermentation.

Labourers on farms in some parts of Scotland are habitually given "sowens" as part of their diet; this is an acidulous drink, and is made from the fermented husks or bran of oats. "Flummery," in England, is something of the same sort, but is somewhat different.

"Leting," as made by the Basutos, would be liked by native labourers, whether they could get vegetables or not. It is a question worth consideration, whether it would not so add to their health and vitality as to enable them much better to resist or throw off malaria and other diseases. It is a question also whether it would not similarly benefit even Europeans when sometimes, as during war, food cannot be properly varied.

I think mine managers would do well to try this and some other experiments, and to have "leting" regularly well prepared and issued in proper quantities to native labourers. The managers could have it well made in the light of scientific developments of the arts of malting and brewing so far as the production of wholesome "sweet wort," crude or clarified, is concerned.

I have known it well made from maize, and clarified and bottled. It then tasted much like bottled effervescent American cider.

"Leting" can, however, be easily and well prepared in the Basuto way. They make it by taking good, sound, unbroken Kaffir corn (mabele) and malting it. When malted they call it "mela" from the verb "mela," to *sprout*. To malt the Kaffir corn it is soaked in clean spring water for two or three days till it gets soft. They then drain it of the water, and put it in a heap on a clean floor, or on mats, covering it well up with skins, sacking or blankets. Sometimes in cold weather they put heated stones between the coverings. But care has to be taken not to let the corn either be heated too much or chilled, as it will rot, turn grey, or mildewed. Europeans sometimes put it in a box or tin or a jar with a lid, cover it up, and in cold weather put it near a stove. When the grain has properly sprouted, —that is, when the sprouts are half an inch long, it is uncovered and spread out to cool. After that, this malted grain is allowed to sweat a few hours, and then it is spread out in the sun and turned, in order to dry it completely, again. After it is quite dried and hard, it is well ground to a fine meal, and is then ready for use in making "leting."

"Leting" is made fresh each day. It is prepared towards evening, so that it may be ready to be drunk sooner or later the next day.

The ground malt is thrown into a pot while at the same time boiling water is poured on it. It is kept briskly stirred all the time *until not a particle of the malt meal remains at the bottom*; it is of the consistency of thin dough, and is generally of a bright red colour, if the Kaffir corn has been properly malted. The pot is then set aside till the liquid is cold; then cold water is added while it is being stirred, till it is of the consistency of thin gruel. Then a handful of the dregs of former "leting" is put in, or a small cupful of the "leting" of the day before, and this is stirred up with it. It is then covered up till the next day, when, earlier or later, it is ready for use, fermentation having sufficiently set in. It should then be sweet, but visibly fermenting and slightly stinging to the tongue from the bubbles of carbonic acid gas. When the right stage of sharpness to the palate is reached, the whole is strained through a sieve or a long narrow bag called "motlotlo." It is then the proper orthodox "leting," and would be called sweet wort in England. This is the "leting" of the old days of Moshesh and his ancestors. It was in the old time considered unchieflike to drink anything at all intoxicating. Some Basuto women are famed for making "leting" to perfection. It is an art.

Even after the dregs of "leting" are strained out, water is added to them, and when the whole has settled this also is used as a light fermented drink.

"Leting" gets more sour towards evening and still more so the next and the next day, until it grows quite too sour for use. For each day of its age it has a separate name. The Basuto likes to drink very sour things, even vinegar.

The dregs of "leting" are sometimes used to mix with meal to make bread.

Nowadays the women in Basutoland in making "leting" sometimes leave a little of the malt meal at the bottom of the pot when the water is poured into it. This is the unorthodox way; it sets up a somewhat different degree and character of fermentation, so that the "leting" when made begins to approach a little in its nature towards "joala," the intoxicating beer, and is not so nice to drink.

The difference between proper and either improper "leting" or "joala" is one of degree and character, of fermentation; a brewer would understand it well.

"Joala," the Basuto's real strong intoxicating beer, is, I believe, made by boiling the sweet wort, and adding and stirring into it a quantity of the meal of raw (not malted) Kaffir corn, and leaving it to ferment further; then a much stronger vinous fermentation takes place and "joala" is formed and can be made very strong. It has to me an unpleasant crude raw taste and is gritty. It is used purposely to get tipsy or drunk upon. For this purpose it is drunk in very large quantities till the stomach is quite distended. It is said to keep on fermenting in the stomach, and that this hastens the intoxication. This is produced in all stages up to the violent and stupefying stage. It causes violent headaches, bloodshot eyes, indigestion and often several days' illness, even when not mixed with spirits. Natives often add brandy to it, and this of course renders it worse than either beer or brandy in its effects. It is partly this practice, no doubt, which was represented to Lord Milner, and caused the temporary absolute prohibition of Kaffir beer in towns and mining centres. I have no doubt of the wisdom of that decision.

Whether such Kaffir beer is ever really good for food, even in small quantities, is a matter which should be enquired into; perhaps so far as it possesses the same qualities as "leting" it may be of some, but less, use. My impression is that even in small quantities it is very upsetting to digestion, and that pure "leting" would be much better. I do not dogmatise, I only suggest enquiry and experiments.

Probably a craving for something requisite for the nourishment of the body, but missing from the dietary, is at the bottom of the desire for spirituous liquors in many cases among all people. It would seem that there exists a natural demand in the human system for some acid product of fermentation to meet a general or special requirement of health.

Setting on one side the products of distillation and drinks called alcoholic, such as wine and beer (although these are really the results of fermentation), also bread, to make which fermented yeast is employed, I would mention as indicative of this natural craving the "quass" of the Russians, the sauerkraut of the Germans, the cider of the English labourer, and another acid drink made from the refuse of the apples after the juice has been pressed out of them. Boiling water is poured upon it and allowed to stand for forty-eight hours in order to ferment. Among African natives we find "leting" and Kaffir beer; "mead," or honey and water fermented; sour milk in different stages of fermentation, called "amasi" by Kaffirs, "mashi" by Bechuanas, "mafi" by Basutos, "qbei milk" by Hottentots, and "sak melk" or "kalabas melk" by Boers. The same thing is called "koumiss" in Russia. All these are fermented drinks, and the fermentation would appear to make them all more assimilable by digestion. But there seems to be some other reason for the universal desire for the products of fermentation than this, some instinct pointing to their purifying effect upon the blood, some specific action. It must be remembered that we give our stock fermented food, sweet or sour ensilage, from silo pits, which are an invention many thousands of years old. Where distillation from potatoes is carried on, the refuse is greedily eaten by cattle. So also are brewers' grains.

There is another article of food of this character, used by the Basutos, which I should like to mention, as it completes a set of facts upon which I would suggest some provisional conclusion to be arrived at, for further investigation in the future.

The Basutos, owing to the natural increase of population and narrowing of territory, have become crowded into the lower and cultivable parts of Basutoland. They are thus principally and largely cultivators and ploughmen, and have turned much of the pasture lands near their homes into cornfields and gardens. They have to send cattle far away into high mountains in summer; this has led to milk becoming a scarce article with most of them, so that they cannot largely live on fermented sour milk as they formerly did. A remarkable change in the dietary has followed; they have invented a new sour, fermented article of food—not drink—a sour porridge, which they call "sekhakabolo," and I have learnt that it is becoming the main food of the people.. I learn that the Matabele make some sort of sour porridge, too. They call it "ihambaze."

The Basutos, to make it, take coarse mealie meal or crushed mealies. They add to this a handful of the "mela" I have described, that is, Kaffir corn malted and ground for making "leting." They pour boiling water on this mixed stuff, stirring it well in the way I have described in the first process of making "leting." After letting it cool, they add cold water, cover it up and leave it till the next day. When it has fermented they strain off the water and put that in a pot on the fire to boil. In the meanwhile they grind up (on their flat grinding stones, with the round one held in the hand) the coarse wet mealie meal dregs which have remained after drawing off the water, and when this water has boiled they stir the mashed mealies into it; the result is an acid porridge, which they relish very much, just as the Scotch labourer relishes his sour sowens. That is now the principal food of the people, and on it they work hard and thrive.

They cultivate land extensively, and besides this, nearly three-fourths of the adult males go out every year to labour abroad.

It is remarkable that, together with the working out of this change, they have deliberately banished brandy, and that as a people, and in the mass, they are generally sober. The dietaries adopted by great labouring populations in different countries are broad facts upon which provisional conclusions may well be founded.

It is not well to generalise upon a few data; but I think I have already brought together sufficient broad facts to show that it is probable, and worth further testing by experiment, that the health, vitality and power of sustained labour, and of resistance to disease among native labourers, might be promoted by providing them with some such food and drink as I have described as being used to advantage by Basutos and others. I do not say, provide it by the same mode of preparation; but I do say: Enquire, experiment and try providing some food which has undergone such an amount and character of fermentation as will make it assimilate well, and supply what is apparently wanted in the human system. It is often said drinking lemon, or limejuice, and even rubbing it into the skin, gives some protection from malaria. Perhaps drinking the vegetable acid of "leting" would do as well; it would be much cheaper.

If native labourers could be given plenty of vegetable food and fruit, and perhaps limejuice, and, in short, varied diet, probably nothing else would be required; but it might be impossible, because too expensive to do that, so it might be just as well to try what is quite practicable, *i.e.*, simply to malt the grain, which is easily and cheaply obtainable, and then make some fermented food or drink of it, at an expense merely nominal, for grain has in any case to be furnished as the main food of natives.

Where native labourers appear healthy, strong and happy in their work, it might seem wiser to let well alone, though perhaps some variety would make them even more strong, well and happy; but if it happens, as it sometimes does, that a remarkable amount of sickness shows itself, even occasionally, among native labourers, then serious endeavours must be made to discover the cause and the remedy. I suggest one remedy—attention to diet; there may be various other things to attend to besides diet, and I am sure there are, but I confine myself to the one question, diet.

There are different other articles of diet I could mention which might be provided as a change, and different methods for preparing them; I am only opening up the subject a little.

There is one other way of making a very light, easily digestible, nourishing food from Kaffir corn, which I had better mention. It is the food which the Basutos always use on long tramps. I have used it myself. They call it "dipabi." To make it, Kaffir corn is parched in a pot highly heated over a strong fire. The grains generally burst open with a jump and turn themselves more or less inside out. Colonists call this "springing," and they call such grain *sprung* grain, *i.e.*, sprung Kaffir corn or sprung mealies. In America it is called "popping corn." This the Basutos grind with a very little salt; they carry it in small kid-skins on their backs when travelling, or in leather bags on pack animals. It is simply chewed, with an occasional sip of water.

In December, 1873, having suddenly received orders to that effect, I called out a little army of about 200 native mounted infantry to co-operate with other forces against Langalibalele. We had it in prospect that, before reaching other food supply, we should have a fortnight's march up and down the highest mountains in South Africa, the Maluti of Basutoland, a then uninhabited part of that country. I ordered all the women in the neighbourhood to prepare "dipabi" that night, and I provided a little salt to grind with some of it, and a little sugar with the rest. It was cheap; the whole expedition of six weeks' duration cost the Government £1 per man, with his food, horse and ammunition. On this "dipabi," and meat killed on the road, and but sparingly used, we marched, generally leading our horses, and walking and running as mounted infantry should, till we got into the inhabited part of the north of Basutoland. The men did excellent marching, and could have done so without the meat. I mention this to show another way of giving variety with the same article of food. I have heard of Basutos marching hundreds of miles on "dipabi" alone, carried on their backs. I have often wished our sometimes stinted soldiers marching near Basutoland could have had it. In any case it gives variety. I am sure there is considerable chemical change in the parched and burst grain, and that analysis would easily show the reason of its nutritiousness.

I shall now deal with one or two objections likely to arise in a mind considering the questions I have raised. I shall try to deal fairly with these objections. One will say: What about the Kimberley and De Beers compounds, where the dietary question has been already tested on a large scale? I would answer: Examine that experiment fairly. I was at Kimberley in 1894 on the Labour Commission. My recollection is that the labourers were all well developed, well selected, very well treated, well paid, and evidently happy men. They were often paid by results; that is, by truckloads, measurements of work, and number of holes bored. In the compounds there is a hospital with hospital comforts, and the De Beers shop, where they can obtain any article of diet they please to ask for and pay for with the exception of brandy and Kaffir beer. I saw in that shop besides bread, fruit and vegetables, a quantity of bottles of fermented ginger beer, which may be an equivalent of the "leting," which I would suggest our introducing.

Since writing the above I have had the advantage of questioning the chairman of the De Beers Consolidated Mines, and have learnt from him that experience during the war has taught them lessons. Their trained native labourers had to leave, and they have now raw recruits from outside. These, owing to the war, came there with scurvy, and readily succumbed to pneumonia in consequence. So some months since the system was introduced of issuing to the native labourers one pint of Kaffir beer per man per diem. This has had marked beneficial results. I understand Mr. Rhodes wrote from Europe recommending this.

It will be asked: What do you say of the experiment made on an immense scale already throughout Africa in convict diet and labour? I answer: I have not examined those experiments. I question whether any Government fully knows the results. They are rather difficult to test; will-power has to be considered as a disturbing factor. One can test fuel power in machines and state the results in foot pounds, but even with a treadmill you cannot test the value of food in work produced, unless some peculiarly constituted person chooses to try and test it on a treadmill on his person for a long time and manages to keep happy and avoid depression.

One has to deal much with will-power and cheerfulness in these matters, and convicts are not enthusiastic labourers. From observation of convicts once in the Cape Colony, I doubted whether sometimes they were even earning their salt.

I have, however, stated remarkable experiences with regard to convicts and their diet. I have at times heard of similar ones, and I think the experiment I have suggested might well and cheaply be tried with the native—if not other—convicts throughout Africa. It is only broad results that can be looked for.

I would suggest some other questions and answers—broad ones. I would like to ask officers of health throughout Africa: Are natives who feed themselves in their natural state, or those *fed as labourers by Europeans*, whether in prisons or at mines, better nourished? If so, where, and among what classes is it to be found? What is their food, and how is it prepared? Scurvy is simply a result of defective nourishment. It is produced by diet alone, and cured by diet alone.

I think, if the truth were known, it would be found that throughout South Africa, wherever war is being waged, there, not only a tendency to scurvy exists, but the thing itself, which for obvious reasons always has accompanied war. It could easily and cheaply be cured, whether among Europeans or natives, by sweet wort or "leting," unless, indeed, complications such as dysentery or malaria should set in, as they frequently do. They naturally become very dangerous, when added to any scorbutic tendency. Inflammation of the lungs is, I believe, a common accompaniment of scurvy and is then rapidly fatal.

Scurvy rapidly destroys the red corpuscles of the blood; so does malaria. Thus, when malaria attacks a person in whom the red corpuscles are already greatly diminished by the defects in diet which tend to produce scurvy, malaria finds its fell work well on its way to accomplishment.

The diluted citric, malic, acetic and lactic acids respectively found in special combinations in lime and lemon juice, cider, sweet wort, sour milk, buttermilk, &c, would seem to tend to produce healthy blood, the generation of red blood corpuscles, and perhaps their oxygenation, and to prevent their destruction.

Supposing it was decided that sweet wort, "leting," or other fermented food should be supplied to labourers, either as an experiment or as a permanent arrangement, the question with large employers of labour would be how to apply it. Well, European maltsters could be employed, or malting could be studied in books, or with the little explanation I have given, malting could be attempted, or natives could be employed to make it, especially women, who are the maltsters, brewers and cooks. Some malt better than others. Then as to preparing sweet wort or other food, similar procedure could be adopted. Perhaps a brewer's man could be employed, perhaps natives, to make non-intoxicating sweet wort, perhaps some Scotchman would teach how to make sowens. Or some Basutos could be introduced, men, women and children, and manufacture food and teach the natives and others by object lessons. They are much in advance of other natives in their cookery and in keeping vessels clean, a most important point in brewing. They are comparatively an industrious people, both men and women, and have for three-quarters of a century worked for Europeans, to mutual advantage, both in outdoor and indoor work, and might set the natives here a good example.

Probably it would be found that food could be much better and more economically prepared wholesale for native labourers when in considerable numbers than when left to them; division of labour is itself economical, native *men* are not cooks, and natives are great wasters of fuel and want to keep a big fire going night and day.

Natives at their homes only eat two meals a day, about 10 a.m. and 7.30 p.m.

Since writing the above and other matter which I shall presently read out, I have, as I from the beginning intended, collected more information from Native Commissioners regarding varieties of farinaceous grain and pulse cultivated and used either with or without fermentation by natives here. I shall now refer to these.

Maize (*Zea mays*) is now called "Indian corn," or simply "corn," in its native country (America), and "mealies" in South Africa. This is grown here more by farmers than natives, and bought by employers of native labour in preference to other kinds, as it is easily harvested, cleaned and ground.

The natives generally grow a small, hard, flinty-husked variety. After damping the grain a little they stamp it with a big wooden pestle in a mortar called a "stamp-block" by the Boers, and they winnow it to drive the coarse husk away. They then put it in a pot and pour warm water over it so as to cover it; they let it soak for a day, then they thoroughly wash it, partly dry it, and afterwards stamp it again and winnow it again to get a second skin off it. Then they dry it, and the most approved way is to put it into a pot, which the Mashona call "ruenga," to make it perfectly dry and *warm*, when it grinds better into a fine meal. Sometimes instead of this they first break it in the stamp-block into a coarse meal called "sengwa," which may be cooked and eaten. Otherwise they grind the "sengwa" on a stone.

The Mashona seldom boil the stamped mealies whole, as Boers do. They grind it fine and place the meal in the sun to dry, and keep it for use. Meal from all sorts of grain is called by the Mashonas "ufu." They stamp, husk and grind all grain in the elaborate ways I have described, and they call all porridge made from any grain "sadza" or "tsadza."

In Natal mealies are generally grown from better varieties than the Mashona's mealies, and are often eaten boiled whole, or after one stamping, or the meal is ground without the above preparation and boiled for porridge. The Agricultural Department here has recently introduced a small quantity of a Peruvian variety, and will obtain more. [Cuzco or Peruvian maize, obtainable from Messrs. Praschkauer & Co., Ltd., 112, Fenchurch Street, London, E.C.; 28, Brunswick Street, Liverpool, and 50, High Street, Hull. Telegrahic Address: Praschkauer, London.] It is very much larger than any yet introduced, and has a very thin, brittle husk. It gives much fine flour. *The flinty husk of the original maize has been bred off this grain.* Such maize promises to become a great source of food supply, as maize is readily cultivated and dealt with by machinery. We could be taught many ways of cooking it by colonists from the United States.

Kaffir corn, or great millet, is known in science as *Andropogon* *sorghum*; in Kaffir, Amazimba; in Zulu, Amabele; by the Basuto, Mabele; by the Mashona, Mabfunde or Mafunde; in the Soudan, Dhurra.

It is less used in Mashonaland than some smaller grain presently to be mentioned. It may be used, as it is by Kaffirs and Basutos, both boiled whole or after ridding it of the husk by stamping; the meal is generally used boiled as porridge, or sometimes in a much thicker, tough mass, which may be called bread; or it is made into "leting" or Kaffir beer. This grain is much grown through a great part of Africa and Asia, and more or less in Europe and America.

Rukweza, or Rapoko (known in science as *Eleusine coracana*), is a very small, *hard*, red grain, looking like Kaffir corn, but from a wholly different, low-growing plant. It is said the Mashonas have six varieties of it differently named. I learned from Mr. George Watt, a Government officer stationed in the Indian Museum, Calcutta, whose special duty it is, as Government "reporter," to investigate matters connected with economic products, that this grain and munga (of which presently) are both largely grown and used in India as articles of food, but are supposed to have been introduced from Africa. They are probably the original food grain of Mashona-like tribes of Central Africa, and, like other grain, developed from a grass. I learn also that *Eleusine coracana* is now much grown in Japan, so it is extending its range, and suits a wide range of climate. Under European cultivation "rukweza" grows much later, tillers much better, bears more and develops larger grain than when cultivated by natives. Probably, like maize and "pedigree wheat," it might, by repeated selection and careful cultivation, be bred to have a less flinty and a thinner husk, while its size might be progressively increased. At present its diminutive size and hardness give it an advantage in one respect:—it is impenetrable by weevils. It appears to me the most nitrogenous of farinaceous grains. Natives consider food prepared from it more nutritious and satisfying than that from any other grain. Rice-eating natives from other countries quickly learn to prefer food prepared from "rukweza." It and "munga" can be sown late, after other native grain crops show they will fail from drought, locusts, etc., so they are anti-famine crops. As yet, a disadvantage in these two crops and Kaffir corn is that winnowing them is a slow, laborious, difficult process. They do not lend themselves to present methods of machine-threshing or milling. I propose to submit to the Scientific and Technical Department of the Imperial Institute specimens of these three, in the grain and in the ear and straw, for examination and advice as to the possibility of machinery being adapted or devised for threshing, grinding, husking and other treatment. I propose to place before that very strong and well-equipped Department which has been instituted to aid and advise all parts of the Empire, the following questions:—

(a) Have any systematic efforts yet been made to improve these grains, and for the above objects, and, if so, with what results?

(B) Is it probable that by careful and continuous selection for a few years with improved cultivation, the hard husk of Kaffir corn, rapoko and "munga" could be reduced to a minimum and the grain enlarged, as has been done with mealies and wheat, and with quicker maturity?

(C) Is it probable that by developments of machinery, these grains could respectively, in an improved manner, be harvested, cleaned, husked and milled, and this on a commercial scale, and that they could be cooked in a simple way on a large scale?

(D) Would it be well to have them analysed to ascertain their relative value in food constituents?

(E) How would the desired results best be promoted: by departmental experiments, or by stimulating scientific investigation, cultivation and invention by offers of rewards by Governments or Departments?

My impression is that Agricultural Departments of England, America, India and Africa and other countries, and the Imperial and Smithsonian Institutes, should cause these enquiries and experiments to be made, for individual efforts can effect little, and only slow, improvement.

When I was administering Basutoland some twenty years ago I found that for years early rains had been failing and that the staple crop, Kaffir corn, had not time to grow, so partial famine was produced. I made such enquiries as I could as to quicker maturing varieties of that slow-growing grain, and obtained in consequence, at my own expense, one variety of Kaffir corn from Abyssinia, and "amber cane" from Missouri; but I left, and could not press on the experiments.

What is wanted is to see whether this quick maturing, etc., cannot be accomplished, and whether rapoko and munga may not have serious value as, at least, a supplementary crop to save the situation when rains will not fall in time. These grains appear not only to have come to stay, but to be extending in the world's cultivation, and it would seem worth while to improve them.

It may possibly aid the Institute's department in its enquiries if I mention that I was once shown, and ate, at an isolated American Mission, a very light cake made of rapoko, and advantageously used by a person whose indigestion had been impaired by illness. The rapoko was "sprung," then well ground, and then "bolted" through some fine stuff so as only to leave a fine flour of which the cake was made. I do not mean to suggest that native labourers are to be fed on cakes.

Natives complain, perhaps with some little truth, that all their grain is rendered disagreeable or injurious to them by European methods of grinding. It must be remembered, however, that Basuto and others grind Kaffir corn without husking it, and even eat it boiled whole. At home, as I have said, the Mashona women always stamp "rukweza," etc, in stamp blocks to get rid of the hard husk before they grind it into a fine meal. They mix it with sufficient water, and boil it about half-an hour, continually stirring it with a stick, to make their porridge. With it they use salt, which they now obtain from Europeans. They used to obtain it by burning a certain grass growing besides rivers, putting the ashes in water, filtering it through sand, and boiling the water till a sediment of salt was produced. Each village used to have its salt manufacturer. (Native labourers will require to be well provided with salt.)

"Munga," or "nyautzi," as the Zulus call it, is *penisetum typhideum*. It is a small whitish millet-like grain growing on a head or cob something like a large bulrush, at the head of a stalk something like that of Kaffir corn. Natives *particularly dislike* the meal made from *this* grain by grinding it in European mills; they say the porridge from it gives them internal pains and dysentery, from the presence in it of particles of the flinty husk. They only eat it at home after this husk is got rid of by stamping, and it has been finely ground and made into porridge.

Rice has always been grown and used by Mashonas; the husk is got rid of by means of the stamp block.

With regard to Pulse, there are a number of kinds of beans, "inyemba," and there is *Arachis hypogæa*, called monkey nut, pea nut, or *ground* nut (from growing underground). The Zulu name is "mazamban," and the Mashona name is "zungu" or "inzungu."

I understand there are two varieties of these monkey nuts; they are generally used as follows:—

They are first partly baked on a fire in the Mashona baking pot "ruenga" above mentioned. When they are brown, they are taken off the fire and rubbed between the hands to remove the skins. They are then crushed and ground, when they turn into a thick oily mixture. This is put into a little pot called "hodghgana" or "tshikari," containing boiling water. The whole is well mixed and is called "doorve." The native porridge is eaten, first dipping it into this "doorve," which is also mixed with a porridge made with rapoko meal and boiled pumpkin, the whole being then called "noorpe."

"Doorve" is also mixed with boiled wild greens and other vegetables.

If meat is procurable as a substitute, "doorve" is not mixed with other boiled vegetable food, but *tainted* meat is itself eaten with "doorve," and is said by the Mashonas to become then most delicious and preferable to fresh meat.

This and much more than I can now publish I have lately received from Mr. Native Commissioner R. Nesbitt, V.C., to whom I am greatly indebted.

A considerable variety of vegetables is grown by natives at their homes; these include sweet potatoes, called "mbambayira" or "mbambayila," also pumpkins and Kaffir watermelons. The last two are cut into strips, dried in the sun, and kept for winter use by the Basutos and Bechuanas. Potatoes are as yet only grown by Europeans, and they sell at a very dear rate. Basutos grow melons and watermelons largely and make spinach of several kinds of herbs.

Manioc or cassava (the sweet variety, I believe), from which tapioca is manufactured, and cassava beer is made in other countries, is grown in Portuguese Territory and Melsetter; it is called "zambuya." The Boers in Melsetter call it "broodboom" (bread tree). They dry the roots and stamp them, and thus obtain a fine white flour which they mix with wheat flour to make bread. They use it also to thicken soup. I have grown manioc here, and think it will grow generally in Rhodesia, especially in granite sand, or near granite hills.

As for fruit, generally only wild sorts are eaten by natives.

From the above list of articles of food grown, it would at first sight, perhaps, seem easy to supply a sufficient variety of vegetable food to keep native labourers in health, but the difficulty is to get that food to the labourers, away from their distant homes and gardens. Supply and demand do not balance, and transport is difficult. Eventually, to supply many mines, fully and economically, European ploughing, farming and machinery and steam will be required, so the native diet question will become eminently a "farmer's question." Great industries will require great economies of human labour. It is not hands, hoes and fingers, or little native gardens that will supply the food of the future. Natives will be more economically employed at mines. Machinery must replace uneconomical hand work.

As to meat, the Mashonas eat almost everything that lives. They roast or cook, and greedily eat the most stinking meat, and probably are often ill from doing so, and put it down to witchcraft, and then want somebody to be killed. Meat is too dear to supply to native labourers generally.

For the above reasons—the difficulty of furnishing variety of food in meat, vegetables and fruit—I have been endeavouring to show how, even when the supply of food is almost or altogether restricted to grain, it may be so prepared as to sufficiently nourish the body and maintain health. I have shown that malting and brewing is one of the ways of so preparing food.

I have now to communicate information I have asked for and obtained through officers of the Native Department as to how these arts are practised among the aboriginal inhabitants of Rhodesia.

Mashonas, in order to malt grain, generally soak it in a bag or basket in cold water for one, two, or more days. Some afterwards place it in a bag or basket to sprout or malt, while others put it in an open heap in the sun for that purpose instead of covering it as the Basutos do. Then they dry and grind the malt, but in a few parts beer is made from unground malt.

No. 1 process, then, is this: Some boil the ground malt till it forms a thin gruel, while some only heat it over the fire without allowing it to boil. It is, in either case, constantly kept well stirred, and is then left to cool and ferment in a clean pot. Some place it for this purpose in a pot or pots *with a neck*. Such a pot with a neck is called a "fukoor" (this sounds Arabic). When sweet and fermenting, and for some days, it is used at meals by the whole family;

children are constantly fed upon it. It is then like the Basuto "leting" in its early stage, and Europeans sometimes imagine it has honey in it. It is drunk from one day to five or six after making, and is called in different tribes "bumi" or "bumhe" or "buru" or "doro" (this is Arabic), and sometimes "begwa maüro" (*i.e.*, "cooked in the evening").

No. 2 process: To make beer of some strength this "bumi," on the day following that on which it was made, is put back into a pot and boiled strongly for two or three hours till it is reduced to one-half its quantity. This is then, in some parts, put into necked pots, and when quite cool, a flat stone is put upon it, and it is luted or sealed with clay. This beer will, when so covered, last a month, but it is not very strong.

No. 3 process: To make a stronger beer, the kind last described is allowed to stand three full days. Then three or four pounds of ground malt, uncooked, is added to each pot and it is sealed up and left standing for two full days. It is now called "m'sungwa," and is stronger.

No. 4 process: To make a yet stronger beer, double the amount of ground malt is prepared as for the first process (bumi), and strained and added to the last mentioned (m'sungwa).

If one part of No. 4 is added to an equal part of No. 3, the beer is very strong, and one pint and a half is enough to make an ordinary man intoxicated.

Where it is not required to be so strong, two parts of No. 3 (m'sungwa) are added to one part of No. 4.

After mixing, the whole is left to stand for 12 hours before drinking. For a time the longer it stands the stronger it becomes, but after three days it becomes too sour to drink.

It is principally men who drink intoxicating beer; they frequently become mad-drunk.

I pass over the modes of making beer practised by Kaffirs, Matabele and Zulus. There are local differences, and none appear to come up to the perfection of that of the Mashona brewers, whose procedure I have described above: this procedure I suppose is like that of the Spaniards of the time of Pliny, who, he says, were in advance of the Gauls.

Natives say that "rukweza" produces stronger beer than any other grain.

Natives in Portuguese territory beyond our north-east border, and some within it, distil spirits from must, made from a small wild plum. They use a gun-barrel as a nozzle to the still—so, I think, did Sir Samuel Baker, when he made potato spirit in Uganda. The knowledge of distilling is likely to spread, and spirit will then be distilled by natives from grain and other things and mixed with beer.

It will be seen from above how necessary it is to distinguish when talking of "Kaffir beer," and that anything from a sweet or sour gruel to a highly-intoxicating beverage may be included under the name "beer"; all *look* much alike.

Beer is made from the mahoboba fruit and from the berries of the artsha or marhaasha tree, also from the squeezed-out sap of two trees (olives) mugwiranga and mazira. This reminds one of spruce, birch and maple beer, which are the most ancient British fermented beverages.

It has lately been suggested in the Chamber of Mines that natives, when coming up heated from the mines into the perhaps cold night air, should be given a cup of hot coffee before going to their compounds. I venture to suggest, firstly, that a hot drink might make them only perspire the more, and become more susceptible to chill; so that if any hot drink ought to be given, it should be after they reach a warm shelter. Then I would suggest that if a hot drink is required, it should be something like hot gruel, rather than coffee, which would tend to prevent their sleeping; and, finally, I am inclined to think that at night a good warm blanket or a loose, warm woollen shirt, or both, put on then, would better protect from cold than a hot drink would. I do not wish to be led to go much beyond my subject, "diet," but I must venture to suggest that it will be better for the health and capacity for work of native labourers that they should occasionally don a good dry blanket, rather than either constantly wear European clothing (which they *will* wear day and night, and wet and dry, and always dirty and soaked with bodily exalations), or wearing nothing at all but their usual strip of loin calico, which, to avoid buying a blanket, some will restrict themselves to both day and night, and in rain and dew, while they *will* strive only to roast themselves at night at a fire, one side at a time, if they can. Generally speaking, the naked native is more hardy against cold than the clothed one, because the skin of his body is hardened, as the skin of our faces and hands is. Wearing merely a blanket on occasion, to defend from cold the more vital parts in the trunk of the body, does not diminish this hardiness.

To get good work from natives they must be rationally taken good care of, and taught, with great difficulty, to take good care of themselves. They suspect white people's advice, and require native advisers.

This difficulty I may illustrate:—A native took service with me. He was already ill, and it turned out that he had double pneumonia. I took him to the hospital, he complained of being starved, that they were not *feeding him up*! Also that they washed him in the middle of the night (he was being fomented with hot water) and it would kill him! Presently he ran away while in the crisis, to try to get a witch doctor; luckily he was caught and his life saved, against all probability.

I have now, as I set out to do, slightly raised the fringe of a great subject, to let in a little light and induce investigation and discussion. If in dealing with native diet I have furnished some food for useful thought, I shall be much pleased.

COUNTRY REPORTS.

Bizana.

MAJOR H. SPRIGG, R.M., 30th April, 1902.—During the month there have been several hailstorms in different parts of the district, which have done considerable damage, otherwise the weather has been good. The harvest appears to be very patchy; very good in some parts of the district, and very bad in others. Hailstorms and grub have caused a great deal of damage. Stock are doing well.

Elliot.

J. P. CUMMING, R.M., 30th April, 1902.—Prospects for the farmers are poor. Unless we get rain soon they will be serious.

Flagstaff.

J. H. ROOSE, R.M., 30th April, 1902.—Crops throughout the district are looking very promising and a good harvest is expected. Pasturage is still very good and no frost has yet fallen. Stock of all classes are in excellent condition, and with the exception of a few cases of "black gall-sickness" among cattle, no other diseases have been brought to my notice. Prices of cattle are very high, and at a sale held here on the 26th instant, Kaffir cows with small calves realised £26, trek oxen £18 and heifers £14 apiece.

Kokstad.

W. P. LEARY, A.R.M., 30th April, 1902.—The weather during the past month has undergone a decided change and it is now quite evident that the dry season is once more upon us. With the exception of a severe hailstorm which passed over the town during the early part of the month, very little rain has fallen. One or two slight frosts have occurred, but they were scarcely perceptible, and a spell of warmer weather has now set in. The veld is fairly good, and in the kloofs and ravines the frost has made no appreciable difference to the grass. The cattle, on the whole, are healthy—only two cases of lung-sickness occurring in the Township, and the usual prompt measures were taken to prevent the spread of the disease, with good results. Small stock still continue to do well and the demand has been consistently steady, Natal buyers taking up all that have been offered. A few cases of biliary fever amongst the horses have been reported. The forage crop appears to have been an abundant one, large quantities being offered for sale each week on the local market, and the same may be said of the mealie and potato crops, and no anxiety need be felt of a shortfall during the coming winter.

Libode.

J. C. GARNER, R.M., 1st May, 1902.—There is nothing of importance to report upon regarding the past month, which has been a fairly dry one, and very little rain has visited the district. Stock of all kinds are looking in good condition, and there is no sign of any disease amongst them. The district is now free from lung-sickness.

Lusikisiki.

C. W. CHABAUD, R.M., 30th April, 1902.—Natives have commenced harvesting their crops, the lands sown early in the season being now fit for the reapers. A fair yield of Kaffir corn is expected, while the mealie crop is not so good. Stock of all kinds are in good condition and free from disease generally.

Maclear.

J. S. SIMPSON, A.R.M., 3rd May, 1902.—The much needed April rains to bring on the winter feeding crop have not fallen, consequently farmers are not anticipating a good time for their stock unless, as was the case last year, an early spring sets in. There has been a little redwater, but principally from stock imported from other districts, and the same remarks apply as to a case of lung-sickness in a herd of cattle in the village. Frosts appeared about the middle of the month, but not heavy ones. Stock are in good condition considering the dry autumn we have had.

Matatiele.

J. F. C. REIN, R.M., 30th April, 1902.—Owing to a favourable rainfall a good deal of new land has been turned over during the past month, and a fair quantity of wheat has been sown. The mealie and Kaffir corn crops now about to be reaped will yield about one-half of an average crop. Several outbreaks of lung-sickness and redwater have been reported, and the localities have been duly quarantined.

Mount Ayliff.

H. H. BUNN, R.M., 30th April, 1902.—The crops in this district are doing well and a fair yield may be expected. Cattle are doing well, and there is every prospect of good pasturage for the winter.

Mount Fletcher.

J. C. HARGREAVES, R.M., 1st May, 1902.—The weather during the past month has been dry, very little rain falling. The veld is dry but stock so far are looking well. Lung-sickness is gradually disappearing, and I hope that next month the district will be free from this scourge. Natives are busy reaping their crops, but I am afraid the yield will not be as good as was anticipated, hailstorms in different parts of the district having done a great deal of damage

Mount Frere.

H. B. Garner, A.R.M., 17th May, 1902:—Agricultural outlook in this district continues to be much the same as last month. Very little rain has fallen.

Mqanduli.

C. Gladwin, A.R.M., 5th May, 1902.—There is nothing of any consequence to report during the past month, which has been very dry, and at times the heat was very intense. Rain fell towards the end of the month. Stock are looking well and no diseases of a severe nature have been reported. Locusts have not made their appearance in this district.

Nqamakwe.

C. J. Warner, R.M., 17th May, 1902:—Abundant rain fell during last month, and the state of the pasture continues good. One case of lung-sickness and four of redwater were reported. Otherwise stock of all kinds are in good condition. As regards the crops, I have nothing to add to my report of last month.

Port St. John's.

W. J. St. J. Turner, R.M., 1st May, 1902:—The spring has commenced with favourable circumstances in some parts ot the district, and in others, where the crops are not far advanced, the occasional showers have been of material existence. Tobacco is plentiful and of very fair quality. Stock of all kinds are doing well.

Qumbu.

A. Rein, R.M., 30th April, 1902.—So far as I can ascertain, the crops in this district, from which I have been away for nearly twelve months, look very well, although rather backward, and give promise of an average harvest. Lung-sickness and redwater unfortunately prevail in some Locations. The infected herds have been quarantined and every effort made to stamp out the disease, otherwise stock of all kinds are doing well. Pasturage is good.

St. Mark's.

A. Gladwin, R.M., 3rd May, 1902.—Mealie and Kaffir corn crops are now being harvested. The former is a failure and the latter only moderate. Stock are in fair condition. Lung-sickness and a severe form of redwater has killed a lot of cattle.

Tabankulu.

T. Norton, R.M., 1st May, 1902.—Things remain much as they were at date of my last report. Reaping has begun, and the fine crops will no doubt be productive of much beer-drinking and the resulting fights. Several further outbreaks of lung-sickness have occurred and have been dealt with in the usual manner.

Tsolo.

W. M. Carlisle, A.R.M., 21st May, 1902.—Adverting to my report for March last, the rains were too late and a large portion of the mealie crop has failed. Kaffir corn appears to have stood the continued drought and fairly good crops may be expected. Pasturage is getting very dry in this district, but all stock continue in good condition. No disease amongst the stock reported.

Tsomo.

W. J. G. Thomson, R.M., 2nd May, 1902.—The rainfall registered at this station during the past month was 1.77 inches. Redwater still continues to appear, several fresh cases having broken out. We have had some very sharp frosts and dry hot winds, and the country is beginning to look very dry and wintry in appearance. Stock on the whole are in good condition. Locusts have not yet appeared in the district. Some of the traders are buying a few mealies from the Natives, but they have not yet started to reap their lands properly.

Umzimkulu.

Capt. E. J. Whindus, R.M., 30th April, 1902.—The prospects of a good mealie crop are by no means so bright as earlier in the season. "Grub" has attacked it to a considerable extent, and the yield will be much less than it otherwise would be. Kaffir corn crops promise a splendid yield. All stock keep free from disease and are looking well.

Willowvale.

M. W. Liefeldt, R.M., 30th April, 1902.—I have nothing to add to my report of last month on the above subject.

Artificial Manures.

The annexed list showing the agents from whom the various artificial manures may be obtained, and the current prices, is publiseed for the information and guidance of agriculturists.

Full particulars as to the composition of the respective fertilizers can be obtained on application to the agents; and attention is also invited to the analyses published in the *Agricultural Journal* of 9th January, 2nd April and 11th June, 1896; 30th Sept., 1897; 27th Oct., 1898; 13th April, 6th July, 1899 and 18th July, 1901.

LIST OF FERTILIZERS.

Attwell & Co., Cape Town. (Agents for Alex. Cross & Sons, Ltd., Glasgow.)	Special Root Guano ..	£6	10	0	per ton of 2,000 lb,
	Potato and Grain Guano ..	8	5	0	,, ,,
	Nitrate of Soda	12	0	0	,, ,,
	Superphosphates 39/40 per cent ..	6	0	0	,, ,,
	Scotia Basic Slag (cont. 30 per cent. Tribasic Phosphate of Lime)	4	15	0	
	Sulphate of Ammonia ..	0	19	6	per 100 lb.
	(Prices free on trucks, Cape Town)				
Jas. Searight & Co., Cape Town.	No. 1 Superphosphates (containing 12·14 per cent. Phosphoric Acid soluble in water, being equal to 26·30 per cent. Tribasic Phosphate of Lime). ..	£5	0	0	per ton of 2,000 lb.
Jas. Searight & Co., Cape Town.	No. 2 Superphosphates (containing 14·16 per cent. Phosphoric Acid soluble in water, being equal to 30·35 per cent. Tribasic Phosphate of Lime). ..	5	10	0	
	No. 3 Superphosphates (containing 17·18 per cent. Phosphoric Acid soluble in water, being equal to 37·39 per cent. Tribasic Phosphate of Lime). ..	£6	0	0	per ton of 2,000 lb.
	Vine Fertilizers	9	0	0	,, ,,

A reduction of 5s. per 2,000 lbs. is allowed on orders of 100 bags or more. Special rates can be arranged if delivery is taken ex importing steamer, the goods being trucked at Docks.

Woodhead, Plant & Co. Cape Town.	Thomas' Phosphate Powder ..	£4	15	0	per ton of 2,000 lb.
	Superphosphates ..	5	15	0	,, ,,
	Nitrate of Soda ..	14	0	0	,, ,,
	Muriate of Potash ..	16	0	0	,, ,,
	Sulphate of Potash ..	16	0	0	,, ,,
	Wheat Fertilizer ..	8	10	0	,, ,,
	Kainit	4	15	0	,, ,,
	Potato	1	15	0	per 200 lb.
	Vineyard Manure ..	1	15	0	,,
	Tobacco Manure ..	1	15	0	,,
	Sulphate of Ammonia ..	1	2	6	per 100 lb.

Subject to a discount for cash.

De Waal & Co., Cape Town.	Jadoo Fibre	10s. 6d. per bale of 100 lb.

White Ryan & Co., Cape Town.	Potato, Vegetable and General garden	£8 10s. per ton of 2,000 lb. If less than ½ ton 18s. 9d. per bag of 200 lb.
	Pure Ground Bone	£6 10s. per ton of 2,000 lb. If less than ½ ton 13s 6d. per bag of 200 lb.
White, Ryan & Co., Cape Town.	Quick-acting Bone and Potash Mixture	£7 per ton of 2,000 lb. If less than ½ ton 16s. per bag of 200 lb.
	Selected Bone Meal for Cattle, Horses, Pigs and Poultry ..	15s. 6d. per 100 lb.; special price per ton.
	Bone Grit for Fowls ..	12s. 6d. per 100 lb.
	Superphosphates ..	Wholesale only.
Malcomess & Co., E. London.	"Malcomess" A. Fertilizer, for Potatoes, Mealies, Vegetables, Orange and other trees ..	£9 per ton of 2,000 lb.
	"Malcomess" B. Fertilizer, for cereals, especially wheat ..	£9 per ton of 2,000 lb.
	Accompanied by guaranteed analysis by Prof. Hahn ..	(less 5 per cent for cash).
James Flower & Sons, Cape Town.	"H.B.T." Gypsum	£3 10s. per ton of 2,000 lb.
	Pure Ground Bone Meal	£8 10s. ,, ,, (in bags f.o. trucks—Cape Town).
Government Guano:—	Ordinary Guano	£6 10s. per ton of 2,000 lb. or 13s. per bag of 200 lb.
	Rock Guano	£6 17s. per ton of 2,000 lb. or 13s. 9d. per bag of 200 lb.

For use within limits of Colony.

Price includes delivery at Cape Town Railway Station.

D. E. Hockly & Co., East London.	"Hockly's Special Fertiliser." A complete manure for all crops	£9 per ton of 2,000 lb. less 5 per cent for cash.
	Pure Bone Meal	Special Price.
J. G. Steytler & Co., Cape Town.	Phosphates or Basic Slag	£4 2 6 per ton of 10 bags each 200 lb.
	Superphosphates ..	4 12 6 ,, ,, ,,
	Dissolved Bone ..	6 7 6 ,, ,, ,,
	Grain Fertilizer ..	7 0 0 ,, ,, ,,
	Potato Fertilizer ..	8 0 0 ,, ,, ,,
	Vino Fertilizer ..	8 0 0 ,, ,, ,,

The Feather Market.

CAPE TOWN PRODUCE.

Messrs. Wm. Spilhaus and Co. report under Saturday's date, May 31, as follows :—

Ostrich Feathers.—**Our last sale was well supplied with a good average assortment. Competition was not so active, and we make prices generally weaker all round compared with last sale.**

The London sales open on Monday, the 2nd instant.

Business for the two days, 1,013 lb., which sold for £2,354 12s. 6d. We quote :

	£	s.	d.	£	s.	d
Whites (primes) ..	12	0	0	15	0	0
Firsts (super)	9	10	0	11	0	0
Firsts (ord) ..	8	0	0	9	0	0
Seconds ..	6	0	0	7	0	0
Thirds ..	4	0	0	5	0	0
Inferior and stalky	2	0	0	2	10	0
Byocks ..	4	10	0	6	0	0
Feminas (super) ..	7	0	0	9	0	0
Firsts ..	5	0	0	6	0	0
Seconds ..	3	10	0	4	10	0
Thirds ..	2	0	0	3	0	0
Inferior and stalky	1	0	0	1	5	0
Dark ..	3	10	0	5	0	0
Spadonas (White)	1	15	0	2	5	0
Light and Dark	0	10	0	1	0	0
Boos (White) ..	1	10	0	1	15	0
Light ..	1	2	6	1	7	6
Black Butts ..	0	10	0	0	12	6
Dark ..	0	7	6	0	12	6
Inferior ..	0	4	0	0	6	0
Blacks (Long) ..	4	0	0	5	0	0
Long Medium	2	0	0	3	0	0
Medium ..	1	0	0	1	10	0
Superior Short ..	0	10	0	0	15	0
Ordinary Short ..	0	7	0	0	9	0
Long Floss	1	5	0	1	10	0
Medium Floss ..	0	7	6	0	12	6
Short Floss	0	3	0	0	5	0
Drabs (Long)	2	10	0	3	5	0
Long Medium ..	1	5	0	1	15	0
Medium	0	12	6	1	0	0
Superior Short ..	0	5	0	0	7	6
Ordinary Short ..	0	2	0	0	3	0
Long Floss	1	5	0	1	10	0
Medium	0	7	6	0	12	6
Short	0	2	0	0	3	0
Inferior Long Blacks and Drabs	0	17	6	1	5	0
erior Floss, Blacks and Drabs	0	4	0	0	6	0
	0	0	6	0	1	0
	0	1	0	0	1	6

Wool.—**Since our last no sales have taken place, and in consequence we have nothing fresh to report.** The London wool sales close on Monday, June 2. We quote: **Karoo grease, for scouring, 3¾d. to 5d. per lb.; Karoo grease, for combing, 5d. to 6¼d. per lb.; extra superfine snow-whites, nominal, 1s. 2½d. to 1s. 3½d. per lb.**

Skins.—**Unchanged. We quote : Merino longwools, 4½d to 5d. per lb.; shortwools, 4d. to 4½d. per lb.; damaged and pelts, 3½d. per lb.; Bastards, 3½d. per lb.; Capes, sound, 1s. 9d. each; cut, 1s.; damaged, 6d.; goatskins, 10½d. per lb.; sundried, 6d. per lb.; scurvy, 6d. each; other descriptions according to quality.**

GOVERNMENT NOTICES.

Cape Government Railways.

ADMISSION OF APPRENTICES INTO THE LOCOMOTIVE DEPARTMENT.

There are vacancies for Apprentices in the following Branches of the Locomotive Workshops at Salt River, viz.:—

Boiler Shop	Three boys for heating rivets and cleaning Boilers, to learn the trade of a Boilermaker.
Carriage Shop	Two boys, to learn the trade of a Sawyer.
Carriage Shop	One boy, to learn the trade of a Carriage Fitter.
Carriage Shop	Two boys, to learn the trade of a Coach Builder.
Carriage Shop	Two boys, to learn the trade of a Coach Painter.
Blacksmith Shop	One boy, to work steam hammer;

and applications from youths between the ages of 14 and 16 are invited for filling the vacancies.

Applicants must have passed the 5th Standard, and will be required to produce a certificate to that effect, and also certificates as to character.

Applicants who are able to produce proofs of having satisfactorily passed a higher standard of education will receive the preference in filling the vacancies, other things being equal.

The rate of pay to commence with will be 2d. per hour.

Applications should be sent to the Chief Locomotive Superintendent or Locomotive Superintendent, Salt River, from whom any further particulars can be obtained.

Office of the General Manager of Railways, Cape Town,
8th March, 1902.

T. R. PRICE,
General Manager.

Farmers' Apprentices. Dairy Assistants, &c.

As inquiries are from time to time received from young men from abroad as to where they may serve apprenticeship or gain practical experience of farming in this Colony, before starting on their own account, the Secretary for Agriculture invites Farmers who are willing to receive young men of good character, for this purpose, to register their names with the Under Secretary for Agriculture, stating the class of farming they do, how many young men they are prepared to take, and for what period they would enter into an agreement.

It is not probable that these young men will be in a position to give more than their free services in return for the experience they will gain; that is, they will not be able to pay any fee; and they will look to receiving free board and lodging in return for their services.

It is to Farmers, therefore, who are willing to grant such young men free board and lodging in return for services rendered, that this application is especially addressed.

With reference to the above notice to Farmers, the Secretary for Agriculture now invites young men who are willing to engage themselves as Farmers' Apprentices in Cape Colony to register their names with the Under Secretary for Agriculture, Cape Town. The apprentice will gain experience in farming in South Africa, and have an opportunity for spying out the land before starting on his own farm. To the new comer from another country this is essential, for he has much to learn and unlearn.

Many applications for such Apprentices have been received from Farmers in the Colony. It will be noted that the Apprentice will neither receive wages, nor pay a fee. He will get free board and lodging in return for his services, and at the same time acquire the experience he is in need of.

Applications for employment have also been received from several Lady Dairy Experts and Dairy Assistants; and Dairy Farmers and others desiring to avail themselves of the services of such are invited to register their names with this Department, giving particulars as to situation and extent of operations, etc., and salary and other emoluments they are prepared to offer.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM BASUTOLAND.

By command of His Excellency the Governor the following Proclamation No. 63 1902, was published in the *Government Gazette* of April 22nd, 1902 :—

Under and by virtue of the powers vested in me by the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," and the Act No. 2 of 1897, entitled the "Animal Diseases Rinderpest Amendment Act, 1897," I do hereby proclaim, declare and make known that, whereas the disease known as Rinderpest is prevalent amongst cattle in Basutoland, it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced from Basutoland into any part of this Colony, save and except cattle in yoke and accompanied by a certificate, to be obtained and held by the person in charge of such cattle, signed by a competent and responsible officer, to the effect that such cattle are free from infectious or contagious disease and have not been in contact with infected animals or come from a locality where any such disease shall be known to exist.

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM ORANGE RIVER COLONY AND THE TRANSVAAL.

By command of His Excellency the Governor, the following Proclamation No. 139 1901, was published in the Government Gazette of August 16th, 1901 :—

Under and by virtue of the powers vested in me by the "Animal Diseases Act," No. 27 of 1893, and by the "Animals Diseases Rinderpest Amendment Act," No. 2 of 1897, I do hereby proclaim, declare and make known that it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced into any part of this Colony from the Orange River Colony and the Transvaal, save and except such cattle as may be required to be introduced by the Government for the purpose of supplying Bile or Serum for inoculation against Rinderpest:

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed

And I do hereby further declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

Proclamation No. 217, bearing date the 29th day of October, 1900, together with the regulations issued thereunder, is thereby repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to ustice any person who may contravene the same.

Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined Regulation for checking the spread of the infection is republished.

REGULATION ISSUED UNDER PROCLAMATION No. 30, DATED 20TH JANUARY, 1899.

Whenever under the provisions of Sections 11 and 12 of Act No. 27 of 1893, any area is declared or proclaimed to be an area infected with Rinderpest, it shall not be lawful for any person, animal, animal produce, article or thing, who or which may, in the opinion of the Magistrate of the District in which such area is situated, be liable to convey infection of Rinderpest, to leave or to be removed therefrom.

Inoculation Against Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of the Colony, it is desirable to inform stock-owners of the intentions of the Government as to dealing with the outbreak should it unfortunately become general in the Colony, and to advise stock-owners as to the best course to follow.

The Government propose that, as a general rule, cattle-owners themselves should perform the inoculation. Glycerinated Bile will be used, though circumstances may arise where it will be preferable to use Serum.

Bile Stations will be established in suitable places as necessity arises in localities where farmers have agreed to contribute the required proportion, say 5 per cent., of their cattle for production of the bile. It must be clearly understood that unless farmers are prepared to thus contribute the necessary cattle, it will be impossible for them to have the benefit of a Bile Station.

Glycerinated Bile will be issued free to contributors in proportion to the number of cattle contributed to a Bile Station. To non-contributors a fair charge will be made for bile if any be available for issue.

Serum will be charged for at the rate of £1 per bottle of ten doses.

A limited supply of Glycerinated Bile to meet emergencies will, for a time, be available, free of charge, from the Bile Station which has been established under arrangements with the Imperial Military authorities near Aliwal North.

As occasion requires, Demonstrators will be sent to instruct farmers in the method of inoculation, free of charge. They will, as a rule, inoculate only enough cattle to show how it is to be done, leaving the owner to continue the work. The Government will supply syringes on application to the Resident Magistrate, or to the Demonstrators at the following charges:—20 cc. capacity, 20s; 10 cc. capacity, 15s. This payment may be recovered on return of the syringe to the Magistrate, in good order.

After the experience gained during the outbreak of 1896-1898, the Colonial Veterinary Surgeon wrote* as follows:—

"The method of inoculation which I would recommend in future sporadic outbreaks of the disease is briefly as follows:—

"*Infected Herds.*—These should be inoculated at once with either serum or glycerinated bile; every animal which indicates infection by a rise of temperature should receive a large dose of not less than 100 cc. of serum, or 30 cc. of glycerinated bile; the latter should, by preference, be injected into the jugular vein, so as to secure its immediate action. Then from eight to twelve days after, all the animals in the herd which give no indication of being infected with the disease, or fever temperature should receive an injection of pure bile; not less than 10 cc., and for large animals 20 cc. This will confer a lasting immunity sufficient for all practical purposes.

"*Clean Herds.*—When it is decided to inoculate a clean herd, which is in danger of becoming infected through its proximity to diseased cattle I would recommend that the animals composing the herd should be inoculated first with 20 cc. of glycerinated bile, and to follow this inoculation in from eight to twelve days with an injection of from 10 to 20 cc. of pure bile. This will confer a strong and lasting immunity on the animals in the herd, and will be free from risk arising from the inoculation or of introducing the disease.

"*Use of Pure Bile.*—Pure fresh bile should not be used in an infected herd, if any of the other inoculating materials can be obtained, as it tends to intensify the character of the disease in those already infected, and its immunising effect is too slowly developed to protect the healthy cattle against infection, if they are left in contact with those already sick. If no other means are available, however, the temperatures of the whole of the cattle in the infected herd should be carefully taken by the clinical thermometer, and only those which register a normal temperature should be inoculated with pure bile, the others should be separated from the inoculated lot at once, and carefully tended. If glycerine can be obtained, the spare bile should be mixed with it in the proper proportions—one part of glycerine to two parts of bile. This mixture, after standing forty-eight hours, may be injected into the affected animals in large doses, not only with safety, but with marked benefit.

"*Preparing the Bile.*—The bile should be taken from an affected animal immediately after death, or from one which is killed in the last stage of collapse.

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* See *Agricultural Journal*, June 6, 1899, in which will be found a full consideration of the different methods of inoculation.

" Biles of all shades of colour—except those which are red from the presence of
" blood—may be used, so long as they are clear and free from a putrid smell. Thin
" light yellow biles should also be rejected.

" All the galls extracted at one time should be mixed together, after standing sepa-
" rately for twelve to eighteen hours, so as to render them uniform in strength and
" immunising properties. Pure bile should be used on the second day after being
" drawn, unless it is kept in an ice chest, when it may be kept sweet much longer. But
" if pure bile is used as a second inoculation only, as above directed, it is not desirable
" to keep it longer than twenty-four hours.

" Glycerinated bile is made by adding one part of glycerine to two parts of bile, stir
" the mixture well, then mix all the biles taken at one time, and allow them to stand
" for eight days. But if there is urgency, the glycerinated bile may be used forty-eight
" hours after it is mixed.

" I would strongly recommend that in every outbreak of the disease that occurs,
" every drop of suitable bile, obtained from the animals which die, should be mixed
" with glycerine in proper proportions, two parts of the bile to one of glycerine, so that
" it may be preserved and made available for the inoculation of infected herds, and also
" for the first inoculation of clean herds which may be considered in danger. Pure
" bile for the second inoculation of clean herds can always be obtained when the
" disease appears in any locality, which would be the only reason for inoculating clean
" herds in the immediate vicinity."

Taking the Bile.—To remove the bile the animal must be laid on its left side, the skin and flesh on the right side immediately behind the last rib being cut through; the ribs being raised, the gall bladder will become visible. The gall bladder should be then punctured with a small knife and the gall allowed to escape into a wide-mouthed bottle. If wide-mouthed bottles are not available then ordinary whisky bottles may be used with an *enamelled* funnel, which can be procured at any country store. Every precaution must be taken that the operation is performed in a thoroughly clean manner, the hands of the operator and all knives, &c., being thoroughly cleansed before use.

Inoculating.—After having secured the animal to be operated upon, the necessary dose of bile is injected under the skin of the dewlap by means of a Hypodermic Syringe, care being taken that the point of the needle is not inserted into the flesh, but between the skin and flesh.

Symptoms of Rinderpest.

The Outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined description of the symptoms of Rinderpest is hereby published:—

The early symptoms of Rinderpest are a rise of internal temperature to 106 or 107° Fahr.; the animal stands with its head hanging down, ears drawn back and coat staring; it refuses all food and occasionally shivers. A mucous discharge flows from the eyes and nostrils; the extremities are cold, and the breathing is laboured and frequently accompanied with moaning. The inner part of the upper lip and roof of the mouth and all visible mucous membranes are reddened, and covered with an eruption of minute pimples, and later with a branlike exudation. The bowels are occasionally constipated, but in most cases diarrhœa sets in, the evacuations being slimy and very frequently of a dirty yellow colour. The prostration of strength is great, the animal staggering when made to move. In milch cows the secretion of milk is rapidly diminished, and soon ceases altogether. The disease usually ends fatally in from six to ten days.

It is generally believed that the infection is produced through the respiratory organs; from there the contagion becomes generalised. The contagion exists in the secretions and excretions, urine, saliva, mucous secretions of the nose, mouth and eyes, in the sweat, expired air, blood, and in all the tissues. It may be conveyed directly by the diseased animals, or indirectly by the dung, the bedding, the earth, hides, wool, meat, clothing, wagons or vessels, by people, dogs, sheep and chickens, &c. Contagion takes place only through short distances. When the weather is dry this is reduced to its minimum (about 27 yards), and the progress of the disease may be stopped by a ditch separating the diseased from the healthy animals.

In order to detect the earliest symptoms of Rinderpest, owners of horned cattle are warned of the urgent necessity for keeping a constant and close watch upon their stock. Any suspicious cases should be immediately reported to the nearest Resident Magistrate,

Field-cornet or Police Officer, and the sick animal kept separate till an inspection is made. Stock should be carefully examined daily by a responsible person, more particularly for any symptoms resembling those above described.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October, 1900:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth n the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

- (*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and
- (*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B' hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with any Cattle affected with Lung-sickness and are free from disease; or have been effectively inoculated against Lung-sickness and are free from disease, viz.:—

Number and general description of Cattle } ....
....
....
Owner's name and address } ....
....
In charge of..
Place to which Cattle are being sent........................
(Signature)..
(Address)..
Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature..
Address)..
Date......................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle } ....
....
....
Owner's name and address } ....
....
In charge of..
Place to which Cattle are being sent......................
(Inspector's signature)..
(Address)..
Date....................

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900 :—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be as follows :—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

RAINFALL, APRIL, 1902.

NOTE: n.r. denotes that, up to the date of publication, Returns have *not* been *received* from those Stations.

I. CAPE PENINSULA:	INCHES.
Royal Observatory (*a*) 12 inch gauge	2·51
Cape Town, Town House, Fire Station	3·68
Do. South African College	4·16
Do Sea Point (Falmouth Villa, Hall)	3·06
Do Molteno Reservoir	4·13
Do Platteklip	4·65
Do Signal Hill	2·68
Tafelberg, Disa Head	5·60
Do Kasteel's Poort	4·55
Do Waai Kopje	8·03
Do St. Michael's	8·40
Devil's Peak, Block House	6·00
Do. Nursery Gauge	4·92
Do. Lower Gauge	3·81
Rondebosch	n.r.
Newlands (Montebello)	n.r.
Bishopscourt	n.r.
Claremont	n.r.
Kenilworth	3·69
Wynberg (St. Mary's)	4·70
Groot Constantia	n.r.
Tokai	4·79
Simon's Town (Wood)	3·75
Do. (Gaol)	3·64
Blaauwberg Strand	1·38
Robben Island	n.r.
Strandfontein	1·98
Camp's Bay	n.r.
Fish Hoek	3·36
Cape Point	2·19
Smith's Farm	4·84

II. SOUTH-WEST:	INCHES.
Eerste River	n.r.
Klapmuts	2·45
Stellenbosch (Gaol)	2·91
Somerset West	2·05
Paarl	1·98
Wellington (Gaol)	2·60
Do. (Huguenot Seminary)	n.r.
Delta, Weltevreden (Gt. Drakenstein)	n.r.
[illegible]	1·59
[illegible] Kraal	1·69
Ceres	2·09
Ceres Road	1·39
Rooklands	n.r.
[illegible]	0·86
Do. (Gordon)	n.r.
Worcester (Gaol)	0·31
Worcester (Meiring)	0·20
Do. (Station)	0·20
Hex River	n.r.
Lady Grey (Div. Robertson)	0·20
Robertson	0·44
Do. (Govt. Plantation)	n.r.
Montagu	0·58
De Hoop (Div. Robertson)	n.r.
The Oaks	n.r.
Rawsonville	1·36
Weltevreden (Div. Caledon)	n.r.
Danger Point	1·82
De Doorns	n.r.
Vygebooms Rivier	1·62

III. WEST COAST:	INCHES.
Port Nolloth	0·11
Do. (Howard)	n.r.
Klipfontein	n.r.
Kraaifontein	n.r.
O'okiep	n.r.
Springbokfontein (Gaol)	0·08
Concordia	n.r.
Garies	n.r.
Kersefontein	0·66
The Towers	1·96
Dassen Island	1·27
Malmesbury	1·47
Piquetberg	1·85
Do. Road	1·65
Van Rhynsdorp	n.r.
Clanwilliam (Gaol)	n.r.
Do. (Seydell)	0·40
Welbedacht	n.r.
Hopefield	0·65
Lilyfontein	n.r.
Wupperthal	0·90

IV. SOUTH COAST:	INCHES.
Cape L'Agulhas	0·81
Bredasdorp	0·39
Swellendam	1·01
Heidelberg	0·58
Riversdale	0·56
Geelbek's Vlei (Dumbie Dykes)	0·00
Mossel Bay	0·22
George	0·72
Ezelzagt	0·41
Millwood	n.r.
Sour Flats	n.r.
Concordia	n.r.
Knysna	3·18
Buffels Nek	n.r.
Harkerville	n.r.

IV. SOUTH COAST—*continued.*	INCHES.
Plettenberg Bay	2·45
Forest Hall	n.r.
Blaauwkrantz	1·51
Storm's River	2·70
Witte Els Bosch	n.r.
Humansdorp	0·44
Cape St. Francis	1·34
Hankey	0·25
Witteklip	0·90
Van Staaden's (upper)	0·88
Do. (lower)	0·80
Uitenhage	0·53
Do. (Inggs)	n.r.
Do. (Park)	0·52
Dunbrody	0·57
Port Elizabeth (Harbour)	0·97
Do. (Victoria Park)	1·06
Walmer Heights (near Port Elizabeth)	1·60
Tankatara	0·39
Lottering	n.r.
Shark's River (Nursery)	0·99
Do (Convict Station)	1·06
Grootvader's Bosch	1·57
Karnmelks River	0·76
Armadale	0·48
Vogel Vlei	0·03
Great Brak River	0·25
Melkhoutfontein	0·34
Contlivres	n.r.
Kruis River (Uitenhage)	0·60
Zuurbraak	1·31

V. SOUTHERN KARROO:	
Touws River	0·19
Ladismith	0·60
Amalienstein	0·53
Calitzdorp	0·50
Oudtshoorn	0·40
Vlakte Plaats	n.r.
Uniondale	n.r.
Kleinpoort	n.r.
Glenconnor	0·00
Triangle	0·00
Grootfontein	0·02
Pietermeintjes	0·71
Bok River	0·30
Verkeerde Vlei	0·09
Seven Weeks Poort	0·33

VI. WEST CENTRAL KARROO:	
Matjesfontein	0·41
Prince Albert Road	0·00
Fraserburg Road	n.r.
Prince Albert	0·02
Zwartberg Pass	0·80
Beaufort West	0·15
Dunedin	n.r.
Nel's Poort	n.r.
Camfer's Kraal	1·04
Lower Nel's Poort	1·02
Baaken's Rug	n.r.
Willowmore	0·15
Steytlerville	0·85
Roosplaats	n.r.
Laingsberg	0·00

VII. EAST CENTRAL KARROO:	INCHES
Aberdeen (Gaol)	
Do. (Bedford)	
Aberdeen Road	
Rietfontein	
Winterhoek	
Klipdrift (De Erf)	
Kendrew	
Graaff-Reinet	
Do. (College)	
Do. (Engineer's Yard)	
New Bethesda	
Roode Bloem	
Wellwood	
Do. Mountain	
Jansenville	
Patrysfontein	
Toegedacht	
Klipfontein	
Cranemere	
Pearston	
Fredenberg	
Somerset East	
Do. (College)	
Longhope	
Middleton	
Corndale (Div. Aberdeen)	
Cookhouse	
Doornbosch. Zwagershoek	
Middelwater	
Darlington	
Bloemhof	
Arundale	

VIII. NORTHERN KARROO:	
Calvinia	
Middlepost	
Sutherland	
Rheboksfontein	
Fraserburg	
Onderste Doorns	
Droogefontein	
Gannapan	
Carnarvon	
Wagenaar's Kraal	
Brakfontein	
Vogelstruisfontein	
Victoria West	
Britstown	
Murraysburg	
De Kruis	
Richmond	
De Aar	
Middlemount	
Hanover	
Philip's Town	
Boschfontein	
Petrusville	
The Willows	
Naauwpoort	
Middelburg	
Colesberg	
Tafelberg Hall	
Rietbult (Colesberg Bridge)	

VIII. N. KARROO—*continued*	INCHES.
Stonehills ..	0·41
Cradock ...	0·60
Do. (Rose)	0·61
Varsch Vlei ..	n.r.
Witmoss ..	n.r.
Steynsburg ..	1·03
Do. (Nesemann)	1·06
Daggaboer's Nek ..	1·65
Springfield ..	n.r.
Quagga's Kerk ..	n.r.
Tarkastad ..	n.r.
Drummond Park	n.r.
Riet Vlei ..	0 64
Brand Vlei ..	n.r.
Williston	n.r.
Omdraai's Vlei	n.r.
Zwagersfontein	0·66
Varken's Kop	0·41
Culmstock	n.r.
Doorskuilen	n.r.
Houwater Dam	n r.
Hillmoor	0 89
Glen Roy	n.r.
Fish River	n.r
Spitzkop	0 54
Phizantefontein ..	n.r.
Biesjesdam ..	n.r.
Groot Vley, Theebus	n.r.
Kleinhaasfontein	0 79
Scorpions Drift ..	0·23
Beyersfontein ..	0·26
Zeekoegat ..	0·57
Haasfontein ..	1 24

IX. NORTHERN BORDER:	
Pella ..	n r.
Kenhardt ..	n.r.
Van Wyk's Vlei ..	0·34
Prieska ..	n r.
Dunmurry ..	n.r.
Griqua Town ..	1·20
Campbell ..	1·97
Douglas	1·70
Avoca (Herbert)	0·86
Eskdale	0·00
Hopetown	0·80
Orange River	0·00
Newlands (Div. Barkly West)	0·32
Groot Boetsap	n r.
Kimberley (Gaol) ..	1·50
Do. (Stephens) ..	1·67
Bellsbank (Div. Barkly West)	n.r.
Grootdrink	n.r.
Barkly West	1·66
U[illegible]	n.r.
[illegible]papan	n.r.

X. SOUTH-EAST:	
Varken's Kuil (Div. Bedford)	n.r.
Fairholt	1·17
Cheviot Fells (Bedford) ..	n.r.
Alicedale	n.r.
Bedford (Gaol)	3·12
Do. (Hall)	3·38

X. SOUTH EAST—*continued.*	NCHES.
Sydney's Hope	1·24
Cullendale	3·79
Adelaide	2·33
Atherstone	1·14
Alexandria	0·89
Salem	0·76
Graham's Town (Gaol) ..	1·05
Do. (Bact.Inst.) ..	0·88
Heatherton Towers (near Graham's Town) ...	0·50
Fort Beaufort	2·70
Katberg	n.r.
Do. (Sanatorium) ..	3·79
Balfour	2·06
Seymour	2·57
Glencairn	3·17
Alice	1·49
Lovedale	n.r
Port Alfred	0 69
Hogsback	n.r.
Thaba N'doda	n.r.
Peddie	0·72
Cathcart ..	1·89
Keiskama Hoek ..	3·77
Crawley	2·18
Thomas River	n.r.
King William's Town ..	2·04
Do. Hospita	2·54
Stutterheim (Wylde) ..	2 47
Do. (Besté) ..	2·70
Dohne	n.r.
Kubusie	n.r.
Blaney	n.r.
Kei Road	n.r.
Evelyn Valley	n.r.
Berlin	n.r.
Isidenge	n.r.
Perie Forest	n.r.
Quacu Forest	n.r.
Kologha	n.r.
Fort Jackson	n.r.
Komgha	2·35
Prospect Farm (Div. Komgha)	3·64
Hopewell Do. ..	n.r.
East London, West ..	0·92
Do. East ..	n.r.
Fountain Head	n.r.
Fort Cunynghame ..	n r.
Scott's Bottom	0·38
Bolo	n.r.
Fort Fordyce	n.r.
Melrose	1·35
Sunnyside	0·60
Chiselhurst	1·46

XI. NORTH-EAST:	
Venterstad	0·25
Ellesmere	n.r.
Burnley, Cyphergat ..	n r.
Burghersdorp	1·55
Do. (Le Roex) ..	n r.
Molteno Station	n.r.
Cyphergat	0·78

XI. NORTH-EAST—*continued*	INCHES.
Thibet Park	1·09
Sterkstroom	n.r.
Do. (Veitch)	n.r.
Rocklands	0·79
Aliwal North (Gaol)	1·40
Do. (Brown)	1·44
Rietfontein	1·42
Buffelsfontein	n.r.
Hex's Plantation	n.r.
Carnarvon Farm	0·65
Jamestown	1·50
Queenstown (Gaol)	n.r.
Do. (Beswic)	n.r.
Dordrecht	n.r.
Tylden	n.r.
Snow Hill	n.r.
Herschel	1·77
Lady Grey	n.r.
Bolotwa (Contest)	0·59
Lady Frere	0 63
Avoca (Div. Barkly East)	n r.
Kellands	1·34
Barkly East	n.r.
Glenlyon	n.r.
Gateshead	n.r.
Lyndene	1·14
Mooifontein	n.r.
Poplar Grove	1 55
Biesjesfontein	n.r.
Whittlesea	1·82
Blikana	1·06
Doornkop	0·77
XII. KAFFRARIA:	
Slaate, Xalanga	n.r.
Ida, Xalanga	n.r.
Cala, Xalanga	n.r.
Cofimvaba	n.r.
Nqamakwe	3·73
Main	n.r.
Engcobo	n.r.
Butterworth	1·49
Kentani	1·21
Maclear	n.r.
Idutywa	0·96
Willowvale	1·83
Mount Fletcher	0·68
Elliotdale	n.r.
Mqanduli	n.r.
Matatiele	n.r.
Umtata	1·62

XII. KAFFRARIA—*continued*	INCHES.
Qumbu	n.r.
Kokstad	1·[illegible]
Port St. John's	n.r.
Umzimkulu	0 54
Woodcliff	1·30
Tabankulu	n.r.
Kilrush	1·90
Somerville (Div. Tsolo)	1·18
Tsomo	1·77
Flagstaff	2·75
Quebe	1·81
Insikeni	1·58
Bazeya	2·08
Seteba	1·08
XIII. BASUTOLAND:	
Mafeteng	2·43
Mohalie's Hoek	n.r.
Qacha's Nek	1·36
Moyeni Quthing	2·68
Teyateyaneng	3·59
Leribe	n.r.
Butha Buthe	n.r.
Maseru	n.r.
XIV. ORANGE RIVER COLONY:	
Bethulie	0·77
Kroonstad	n.r.
XV. NATAL:	
Durban, Observatory	52
XVI. TRANSVAAL:	
Johannesburg	n.r.
Do. Cemetery	n.r.
XVII. BECHUANALAND:	
Vryburg	1·16
Taungs	0·94
XVIII. RHODESIA:	
Salisbury	0·85
Hope Fountain	0·94
Geelong	0·73

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EDITORIAL NOTES.

Will Mr. W. L. Menne of Zwagersfontein kindly furnish us with his full postal address. A letter for him stamped as insufficiently addressed has been returned to us. Correspondents should give in addition to their place of residence, the division or postal office.

Here is a capital tip from a gardening magazine for stimulating kitchen garden crops when they hang back in growth, particularly when young stuff for salads require much attention in early cuttings. All growers of chrysanthemums know the beneficial effect of a judicious application of nitrate of soda. Manuring green crops for

·ly cuttings is not sufficiently practised out here and the following directions may prove useful. The ground must be frequently broken on the surface, and this will promote a wonderfully quick growth. Then an application of artificials is good. Let a thimbleful of nitrate of soda be put to each plant. If this can be done just before or during showery weather, so much the better, as the nutriment will then be immediately carried down to the roots. The manure will not, however, take the place of hoeing, which must not be neglected in any case. The above method is practised by some of the most successful growers at home, and experience proves that it is beneficial. It is affirmed that if not wastefully applied the quantity of nitrate should average 1 cwt. per acre. A fillip given to the crops in this manner will often prove to be many pounds in the grower's pocket. On the other hand, quickly-grown vegetables are always better eating and tenderer than slowly-grown samples.

Attention is directed to Veterinary Surgeon Robertson's interim report on the Cattle Disease in Southern Rhodesia, from which it appears evident that the disease is our South African Redwater, only in a more than usually virulent form.

In connection with this subject, it is of importance to note that when the disease first attacks the cattle of a portion of country favourable to its propagation and spread, for the first time, it is much more virulent in its character than at any subsequent period. It will be remembered that the disease entered the Transkeian territories and British Kaffraria for the first time in the summer of 1883. Proclamations were immediately issued quarantining infected areas, and regulating the traffic through them. These restrictions were the means of checking the spread of the disease, and it made very little headway during the summer of 1884. In consequence of this apparent cessation in the spread of the disease, the cattle farmers of the proclaimed areas almost unanimously urged upon the Government to withdraw the restrictions. This was reluctantly assented to, and the cattle, apparently healthy within these infected areas, were allowed to travel all over the Eastern Province, carrying the infected ticks with them, with the result that in the summer of 1885 the disease swept all over the Transkeian territories, the Kaffrarian districts, right down to Kinkelbosch in the Alexandria district, about twenty miles from Port Elizabeth, and carried off about one hundred thousand head of cattle, the mortality in many cases being fully eighty per cent., being most severe along the coast districts.

The Colonial cattle farmers, at that time, were in a worse position than Rhodesian farmers are now, as the causal origin of the disease was not known, nor any method of preventive inoculation discovered, hence intelligent preventive measures could not be adopted. This is not said with the object of minimising the severe losses incurred by the Rhodesian cattle farmers, but to point out that although the prospect looks black at the present time, there is a silver lining to the dark cloud. We have every hope and expectation that if the advice given by the Veterinary Department is followed—to have all clean cattle inoculated with properly tested blood before the next spring returns—that the further losses anticipated by the farmers will be reduced to a minimum.

Wideawake Australians are looking out for commercial openings in South Africa that may be of mutual benefit to both countries. We have received a visit from Mr. Thirlwall, commercial representative of the Tasmanian Government, with a proposition which has been sent to him from a sheep-breeder in his Island State. The correspondent wishes to take a hand in the work of restocking this country with sheep. He sends particulars of some good stock that he has, namely, 55 flock rams lambed in August, 1901, by "Bobs" (T.P.B.) and "Kitchener" (T.P.B.); dams bred by Burbury, sire of Bisdee ewes "Grandee" (T.P.B.). Also 35 flock ewes lambed 1901, bred same as the rams.

The correspondent is prepared to sell the animals for £3 5s. a head delivered at the Hobart wharf, and inasmuch as the Sydney sales take place in July and those at Melbourne in August next, he points out that it is necessary to act promptly should there be a desire to secure the sheep at this end. We may state that he expresses willingness to accompany the animals to South Africa on payment of out-of-pocket expenses.

A letter appears in our queries column from the Department's fruit expert, Mr. Pillans. We are sure the cultural community of the Eastern Province will accept his explanation, and his valuable tip about pruning at this opportune period will doubtless be acceptable.

The article on Yellow Liver in Ostrich Chicks, by the Colonial Veterinary Surgeon, will be sure to attract attention, especially in America and Australia. The ostrich industry appears to have got a fair start in New Zealand and New South Wales.

QUERIES AND REPLIES.

I. Does iron, guano or Thomas' slag lose its value if it is kept damp so that it ;gets into lumps? If so, is this the case with all artificial manures?

II. Can you tell me the cause of rust in potatoes? Has cold, wet weather anything to do with it? My potatoes were still young and fine. The one day still flourishing, and the next black spots on the leaves, and a few hours later quite black and dead. The same was the case with different separate pieces of my farm. The weather was rainy almost all day. Pieces planted earlier from the same seed (potatoes) have remained quite free of rust although they suffered some drought. Have you any remedy or preventive?

III. Will you or one of your readers inform me of the best remedy against sore teats in a cow after calving; especially in the winter months so troublesome and slow in healing.

P. J. Hugo, T. Son.

Daljosaphat, Paarl.

Basic slag or Thomas' phosphate, unlike fertilizers which contain a large percentage of ammonia, does not lose its value as a plant food when it becomes damp, but its efficiency is thereby much impaired, since it is impossible to distribute it evenly over the ground when in a damp or lumpy condition, nor is it readily taken up by the crop while in this state. It is in fact wasted, and to no good purpose. Correspondent's basic slag will have to be dried and again reduced to the finest powder before it can be satisfactorily applied to the land.

Potato Rust or Blight.—I can do no better than refer the writer to an article on pages 553/6 of the *Journal*, Vol. xviii. The disease is well known in this Colony and is only successfully treated by spraying the plants with Bordeaux mixture as soon as they appear above ground and again after the plant is full grown. Directions are given in the article referred to.—E.P.

To prevent the teats of cows from becoming sore and chapped in cold weather, they should be cleaned and dried after each milking, and a little vaseline rubbed on. To heal the teats after they are allowed to get chapped and covered with sores, requires some care and patience in milking so as to injure the sores as little as possible. After each milking bathe and clean the teats with warm water, and rub in some vaseline, oxide of zinc ointment, or a mixture of extract of belladoma and glycerine, which any chemist will mix up for you. But with cleanliness and care, sore teats should not be common even in cold weather.

D. Hutcheon.

I should be obliged if you can furnish me with the following information:—

Spekboom.—Can this plant be grown extensively as a fodder say in drills under cultivation? Would the plant benefit by irrigation and produce a heavy yield of green forage per acre? Have you any advice of spekboom being grown in the Stormberg, and could you provide me with information as to conditions and surroundings best suited to its propagation and growth? I should be glad if you can inform me as to the person to procure a quantity of cuttings from.

Paspalum Grass.—Is good reliable seed procurable in the Colony?

G. L. PEACOCK.

Lemoenkloof, Dordrecht.

Spekboom will be found growing in most parts of the midlands of the Eastern Province. Any of the intelligent farmers know the shrub and would provide branches for cuttings. It may be grown anywhere Eastaway, and can be propagated by cuttings. This plant requires no artificial irrigation water.

I know nothing of the grass mentioned. E.P.

Warts on Cattle.

I find a cure for warts on cattle is to rub euphorbia milk on the affected parts, afterwards giving the animal a dose or two of Glauber's salts.

F. S.

On page 361, vol. xiv. will be found an article by the Colonial Veterinary Surgeon on the contagiousness of warty tumours in the dog.

Oversea Eggs for Setting.

Some years ago I sent a query on this topic to the *Journal*. The question is whether the eggs of the various breeds of domestic fancy fowls (including ducks) can be sent by parcel post from the United Kingdom to South Africa, and still be fresh and retain the necessary vitality to admit of being set for production of chickens. This would mean a journey, oversea and inland conveyance, of not less than a month and in some instances perhaps a little longer. To Cape Town vicinity the conditions would, of course, be more favourable. I presume that some ardent fowl-fanciers in South Africa must have tested the matter in some shape, and their views would be important. I mean the ordinary postal transit, and not in any specially prepared chamber on shipboard. A.D.C.

Komgha, 3rd June, 1902.

We are making inquiries into the matter and hope to say thing definite before long. Eggs have been imported by being carefully packed and suspended in the cabin. In one consignment thus brought out, the recipient informed us that two-thirds of the eggs hatched out. He thinks this is the only way of importing them successfully for setting, as the hold would be too warm and the vessel's vibration would injure their vitality, and the jolting they would get by parcel-post would be equally injurious.

I shall be glad if you will assist me by means of your columns, which are so widely read throughout the Eastern Province, in reaching my friends the farmers, who have been recently taking a new line of work in the way of fruit-culture.

I am aware that they have expected me to come round and visit them as heretofore, and have been disappointed at my non-appearance.

Now what I want to assure them is that the postponement of such annual visits, although inevitable, has been a serious and I may say personal disappointment to myself. Yet there have been causes for it quite beyond my control. Last year I went to England and while there was engaged on special duties, and on my return I had to take up the work involved in numerous questions of land-settlement, reception and establishment of immigrants and general advisory departmental duty. My time has never been so incessantly pre-occupied; but my Eastern friends must not therefore suppose that their interests have passed out of sight. As a matter of fact, I am almost in daily touch by letter with some one or other of them. And it is mainly because I feel myself, in a sense, responsible for helping them in their new culture that I have respectfully declined to accept other duties permanently. Besides, with the unsettled condition of the Colony, with so many farmers away on active volunteer service, it was felt that the success of a visit of inspection, advice and encouragement could only be very partial. My farming friends will therefore understand the position, and may be sure that at as early a date as possible I shall suggest my being sent round to see them once more.

Enquiries as to my probable visit have been so frequently connected with questions regarding the pruning of fruit trees now in their bearing stage, that I take this opportunity of saying that since the shaping of the tree has been effected during its youth, all that will be required in the way of pruning at this, its bearing period of life, will be a little discreet thinning out when the tree is dormant, wherever branches of the head shoots are disposed to become crowded and where they cross one another—that ought never to be allowed—the sooner that such crossing is guarded against the better. The only other suggestion is the topping back of greedy shoots, which are running out to the disadvantage of their neighbours, and also a little summer pinching back, when the tree is a shy bearer, to increase the formation of fruit buds and spurs. In fact, when the tree begins to fruit, its merely vegetative system, which previously has been in the ascendant, drops back into a subordinate position, the tree not being able to give its strength to both sorts of physiological work at the same time.

With my best wishes for their success all round and thanks to you for the use of your columns.

I remain, etc.,
EUSTACE PILLANS.

Can you recommend any books or pamphlets on sheep, Afrikander and Persian varieties?

D. CLARK.

Somerset East.

The reference to the Persian sheep is in No. 5 of Vol. xv., p. 336. This Department is making inquiry both in the Colony and abroad, with the object of obtaining information relating to the Persian sheep and the cost of first-class breeding animals. We do not know of any book descriptive of this breed, etc., etc.

D. HUTCHEON.

AGRICULTURE.

Surface Tillage—Especially of Maize.

Prof. F. H. King, of Wisconsin, U.S.A., in a series of papers on the Principles of Tillage discusses manure matters of importance to farmers in New South Wales planting spring crops.

It is generally admitted by all careful agriculturists that the best means of ensuring good crops from spring-sown seed is to prepare by ploughing well in advance of sowing time any land that is to be used. No matter how carefully this preparatory work is carried out there is almost certain to be left in the soil innumerable weed-seeds that only await the first breath of spring to germinate. If time and the conditions of season will permit, the soil that has lain in readiness might be stirred a little to provoke earlier germination of the weed-seeds, thus making it possible to destroy a considerable proportion of the weeds before the crop itself is planted. On this point Prof. King says: "The first stirring of the soil often so much warms it that weed-seeds near the surface quickly sprout, so that in fitting ground, even for oats, time enough elapses before the oats are sowed to let the weeds get a sufficient start so that the stirring of the soil with the drill or seeder kills many, and this is especially true if the field is gone over with a light harrow 24 to 36 hours after seeding. To a careless observer this statement may appear untrue, owing to the fact that the weeds are not yet up so as to show; but if the seeds have sprouted they kill very easily by the drying of the soil, because they have no root surface to adhere to the soil and keep them alive when exposed to the drying wind and sun.

"It should be kept in mind that a heavy growth of weeds on a soil before the crop is planted tends to reduce the immediately available fertility by taking up the soluble salts, by drying out the field, and by reducing the rate of which plant-food in the form of nitrates is developed. It is of course true that when the weeds decay, the plant-food may be returned, but the danger is that they will not decay quickly enough to become available as soon as needed by the crop, especially if the crop is planted late and the growth of weeds has been heavy.

HARROWING MAIZE AND POTATOES AFTER PLANTING.

"Weed-seeds do not all germinate at once, and while the stirring of the soil kills some of them it places others under suitable conditions to germinate. On this account harrowing a piece of maize or potatoes just after planting and again after they are up is the best and cheapest means of ensuring perfectly clean rows. The broad, light, tilting, spike-tooth harrow is the best tool for this work and when rightly used is very efficient. The teeth should be fairly close together, so that all the soil is stirred, but only to a slight depth after the crop is up; otherwise the plant will be torn out. After the maize is up, the best time to harrow is at midday, when the soil is warm and evaporation is rapid. Under these conditions the plants are more flexible and do not break off as they may in the colder part of the day.

"It sometimes happens that a heavy rain follows planting so closely that the first harrowing must be delayed long enough for the soil to dry out.. Cases like this require the closest watchfulness and the harrow should start at the earliest possible moment. If this is not done the soil will draw together about the plants so closely that if it is stirred about them it will often adhere so firmly as to break them off. There is always a stage after a rain when the soil will easily work up fine, and the tendency is to wait too long. Those who have not made it a careful study will be surprised to see how soon after a rain a light harrow may be used shallow without injuring the soil, and how much more efficient it is then than when used later on a soil which tends to become hard and stiff after rains.

INTERTILLAGE.

"After the harrowing stage has been passed, a more positive tool is needed, which can stir the soil thoroughly to a greater depth. The best tool for intertillage has a sufficient number of teeth 1¼ to

2 in. wide to thoroughly stir the soil to a depth of about three inches. The commonest mistake made in cultivating maize is in not working close enough to the row the first time through the field. There should be so much freedom of motion in the gangs of teeth that with a slight effort they may may be brought together or separated very quickly, and the two gangs of the two-horse cultivator should be held so closely together that, without throwing much earth, the surface in the row is completely covered. The teeth should be set so as to run a little deeper in the centre of the row, where the roots are farther below the surface and where the mulch needs to be deeper on account of the greater evaporation there. As the corn becomes older, the depth of cultivation should be decreased slightly and the distance from the row made a little greater, in order to avoid root pruning.

"In cultivation where broad shovels are used for general work, several bad effects result. In the first place, in order to effectually stir the soil the shovels must be set so that the points run too deeply into the ground and the dirt is thrown so far that it is impossible to work close enough to the row. In the second place, the surface is left so rough that the mulch developed is less effective as such and more of the soil is thrown out of use in the ridges, where it becomes too dry to allow nitrates to form well in it. Besides this, when rains follow the cultivation, a large percentage of the water is absorbed by the ridges, which lose it quickly by evaporation, and thus it contributes but little toward the growth of the crop, because the roots are all below, and capillary action will not convey any nitrates which may be developed there downward, because, on account of evaporation, the motion is in the opposite direction. The ridges even tend to concentrate in themselves, out of reach of the roots, much of the nitrates which are formed deeper in the ground.

"In localities where the fields are not stony and the soil is heavy, cultivators with rigid teeth do better work, because they run steadily at a more uniform depth. The spring cultivator allows the teeth to bend backward when a hard area of soil is struck, passing over the spot without penetrating as deeply as it should, thus leaving the work deficient at just the place where thorough stirring is most needed.

FREQUENCY OF CULTIVATION.

"The frequency of cultivation must vary with a variety of circumstances. It must be repeated as often as a new crop of weeds starts. It will usually be true also that the field will need going over as soon after rains as the soil will permit, provided the rain has been heavy enough to destroy the mulch. In the early part of the season, it will generally pay to cultivate as often as once per week, because, while the soil is wet, frequent cultivation not only saves moisture, but it hastens the development of nitrates in the soil from which the crop must derive its nitrogen supply.

the season is dry and a well-developed dry mulch 2 or

8 in. deep has been formed, there will be little gained by cultivating, if the field is free from weeds. On the other hand, if in such a time the dry portion of the mulch is not more than 1 to 1¼ in. deep it may be made enough more efficient to pay for another cultivation. It must be remembered that mulches tend to become less and less effective by standing, the moisture creeping upward through the soil, causing it to draw together and become more compact.

"There is often another reason for going over the field with the cultivator, even when a good mulch exists and there are no weeds. The evaporation of water from the soil results in concentrating right at the surface the soluble salts held in the soil-water, and as the nitrates form most rapidly near the surface, these are especially liable to gather there where they are entirely out of reach of the roots. But to go over the field with the cultivator, stirring the soil to a depth of 3 in., will throw much of this most valuable plant-food down where it can again be dissolved by the soil-water, and the roots thus secure it. It is because of this need that the very shallow cultivation is not as effective as that 3 inches deep is likely to be.

"Most farmers are familiar with the fact that at a certain stage of growth maize roots throw up short fingers into the top soil, reaching almost to the surface. This is to take advantage of the nitrates and other soluble salts which are concentrated there by capillarity. The dews of night and the light summer showers dissolve these salts and then the roots are able to procure them. To cultivate the field after this condition has developed will destroy these roots, and thus prevent the crop from utilising the plant-food concentrated in this way."—*New South Wales Agricultural Gazette.*

Artificials *versus* Stable Manure.

Although the employment of artificial manures is growing in favour, yet the extension of their use is often accomp considerable opposition on the part of cultivators. Of all the conservative tendencies which exist in the community few are more inclined that way than raisers of crops for market. There exists a widespread belief in the properties of stable and farmyard manures, and although it has been demonstrated over and over again that the use of this form of soil nutriment is not to be recommended for certain classes of crops, yet the quantities still so used are very great. The reason for this is not far to seek. The employment of chemically-prepared substances for enriching the land differs considerably from the rough-and-ready practice pursued with the ordinary stable manures. The latter may be applied in a comparatively indiscriminate manner, whilst to reap the fullest results from the employment of artificials knowledge and care are essential.

The discovery and use of artificials are based upon certain laws in chemical science, and in order to fully enjoy the advantages which these substances are capable of conferring, their application must be made with care and economy.

With the gradual march of science and of our increased knowledge of the soil and its requirements, there has come a lifting to a higher level of the occupation of the tiller of the soil. In many respects, however, the cultivator has not kept pace with this march of scientific discovery, and he has not exhibited any marked readiness to secure for himself, even to a limited extent, the benefits which the researches of the scientist have made available for him.

In the use of artificial manures there must, of course, be something more than the mere rule-of-thumb methods which it has been the custom to pursue in dealing with ordinary dung. The manuring of the land by artificials rests upon a higher plane, and the cultivator who really takes an interest in the subject will be tempted to investigate, though it may be in a very slight degree, into some of those secrets which the scientific agriculturist is opening up for him. Such a course of training must be to the improvement of the individual and tend to enlarge the basis upon which this grower relies for raising his crops. The more the matter is pressed home to our cultivators the more extended the use of artificials is likely to become.

We do not pretend for a moment that the use of chemical manures is ever likely to entirely supersede the form of the material which is now most favoured by the grower. But within certain well-defined limits the benefits to be derived from them cannot be gainsaid. There will still remain a large field open for the useful application of stable and farmyard manures to crops, and it will rest with the practical cultivator to decide in which direction these may most suitably be employed. The chemist in his laboratory makes his deductions, and, within the limitations of his experimental ground, endeavours to substantiate what these have taught him. Such investigations, although not always applicable in a commercial manner, are yet most beneficial to the cultivator, but it ultimately remains for the results of his discoveries to be tested in a practical manner by the grower to see whether the hypotheses of the scientist be sound or not.

Many persons actually condemn the use of artificials at all. The grounds upon which they do so are not always clear. In some cases an agricultural report showing the results in certain phenomenal yields which have been obtained after applying an artificial manure is the main cause of the mischief. The market gardener, filled with a laudable desire to improve his own yield in respect of the crop in question, forthwith orders a consignment of manure, and has it applied to his land. In very many cases he is disappointed. The crop falls far short of the glowing description which he has read, and the grower loses faith in artificial manures in general, and resolves to discard their use altogether. As a rule, the reason for the failure is not far to seek. The grower has made the mistake of confining himself to the results of one set of experiments—experiments have been made in good faith, by entirely disinterested persons, and without even a suspicion of collusion for the purposes of trade advertisement.

The real explanation lies in the fact—as all practical men are aware—that there are certain peculiarities about artificial manures which science is at present unable to explain. These peculiarities concern the soil, the climate, and the locality, and last, but not least, the atmospheric conditions under which the particular application is made. The remarkable feature of the case is that artificials may have been applied to similar crops, and to land which is apparently identical in character to that to which the experiments refer, and yet with widely differing results.

To obtain the best results from artificial manures method must be employed—that is to say, careful personal experiment on the grower's own soil. Two farms situated almost side by side will sometimes give different results with the same chemical. Even two places on the same holding will not yield a like result. On one portion of the ground it will be found that a chemical containing a large percentage of potash gives good results, whilst to a similar crop on another portion a manure in which this particular constituent is almost absent may prove more advantageous.

This peculiarity is, however, not confined to artificials. The same thing applies to apples and plums, peas and potatoes. Certain varieties of these do well and give excellent paying results on certain soils and in certain districts. Yet the same class of plant or seed if transported to another locality will show a marked difference in results obtained.

Our advice to users of artificials is broadly that these materials must—like new varieties of seed—be proved first in their own locality before anything certain can be said about them. But the importance of the question of feeding market crops by cleanly, dependable chemical fertilisers warrants us in advising growers to study this question in every way open to them.—*Market Gardener and Fruit-Grower.*

Lucerne-Growing.

A contributor to the *Australasian* writes on the subject of lucerne culture in Victoria as follows:—

In speaking at the opening of the Silk, Scent, Fruit and Honey Show last week, His Excellency the Governor referred to the importance of giving increased attention to the production of special products, and incidentally mentioned that he had been told that lucerne did not succeed in Victoria. He pointed out that this splendid fodder plant had been of incalculable value to the landowners of Argentina and other parts of South America, where many thousands of acres had been sown down under lucerne, and the stock-carrying capability of the land thereby raised four or five fold. His Excellency's informant did not know much about his subject when he said that lucerne would not grow in Victoria, but if he had said that it is not grown to anything like the extent its merit warrants, he would have stated an absolute fact. Lucerne is grown in several districts in Victoria, but, as far as I know, it is cultivated properly in one locality only, namely, Bacchus Marsh. There it is cut and either converted into hay, or given as green fodder to stock, but elsewhere it is grazed as ordinary pasture for stock. In the Rodney Irrigation Trust area, where a good deal of land is under irrigation, the practice is to water it heavily in the spring, thus producing a luxuriant growth, and, as soon as the ground is dry enough, stock is turned on. Oftener than otherwise the stock consists of heavy cattle, and these tramp the soil to such an extent that it becomes as hard as a brick, and large numbers of lucerne plants are absolutely killed. Very soon their places are taken by inferior grasses or weeds, and eventually the lucerne dies out altogether. This is a stupid and foolish way of treating a lucerne field, and the farmers who follow the practice are making very bad use of their opportunities. Lucerne should never be grazed by heavy stock, or, indeed, any kind of stock, except for about two months of winter, when the plants are practically dormant. It should be cut with a mowing machine every time it has grown sufficiently high to yield 15cwt. or 20cwt. of green-stuff per acre, and after each cutting the harrows should be run over the field to loosen the top soil, destroy weeds, and give the crop a fair chance to grow. It should also be given occasional dressings of artificial manure, superphosphate for preference, at the rate of 1cwt. or 2cwt. per acre. If this were done, four or five crops per annum, averaging at least one ton of hay each per acre, could be obtained from irrigated land. This produce could be utilised for feeding stock, and it would be such a splendid addition to the natural pasture that a largely increased number of cattle or sheep could be maintained in proper condition all the year round. This would mean that the capital value of the land would be raised accordingly, for the stock-carrying capacity has a great deal to do with regulating land values. Lucerne land in Bacchus Marsh has sold up to £100 per acre, the purchasers being farmers in the district who knew its value. They did not buy for speculative purposes; they bought because they knew they could make good interest on the money invested. Why cannot Goulburn Valley farmers cultivate lucerne in a similar intelligent manner, thus largely increasing the value of their land, and at the same time place themselves in a position to meet all obligations to the State in the matter of interest on money borrowed for irrigation works?

HORTICULTURE.

Practical Orchard Work at the Cape.

(*Continued from page* 674.)

THE LEMON.

The lemon has not been much of a success at the Cape. There has been little effort till lately to get first-class known and marketable varieties, and the plague of seedlings has had more visible effect on the market lemon than on the orange. It is truly pitiful to see the large imports of Sicilian and Lisbon lemons coming over six thousand miles by sea to the country which could grow them quite as well, if not better, than either of the countries exporting them.

The lemon is considerably more delicate in constitution than the orange. It will neither put up with sudden vicissitudes of climate nor the alternations of care and neglect which the orange would more or less successfully support. The proof of this fact is to be found in many a garden and orchard where the citrus trees are going back from year to year. The lemons invariably die out first.

With regard to climatic conditions, the lemon cannot be expected to give profitable results in localities where long spells of frost are to be dreaded in winter. As little will it thrive in those nooks of hot and humid coast-land, where we ought to be growing pine-apples and bananas. Probably the altitude of the upper plateau, 3,000 to 5,000 feet above the sea, will, except in a few sheltered and exceptional localities, never produce the lemon in perfection. The base of the first slope inland and the plateau above the elevation being from about 700 or 800 feet to a maximum of 2,000 feet will supply the conditions requisite for producing perfect lemons. It must be remembered that the fruit is somewhat peculiar. It has to mature and ripen, but that ripening process stops short of the conversion of fruit acid into sugar, a change which constitutes ripeness in almost all other fruits. Hence a cool summer and a short duration of autumnal heat is sufficient for its needs, while under such conditions the orange would fail to attain its maximum sweetness. In fact, the lemon belt of a country like the Cape Colony cannot quite coincide with the orange belt, and there will always be many localities where one of the two fruits comes to perfection, while the other fails to do more than reach mediocrity. If, however, the lemon must necessarily be grown together with the orange, it is more important to avoid winter cold than great summer heat. The slower continuous maturing required for the former may to a certain extent be provided by a skilful storage, ripening following an early period of gathering from the tree.

The Cape custom of using the lemon as a stock for the orange has led to the multiplication of seedling lemon trees. So much has been written upon this subject, and the universal practice of European countries has so emphatically endorsed the wisdom of using the Bigarrade or Bitter Seville orange as the healthiest and strongest citrus stock, that little additional remark need be made here. It is on this stock that even the lemon itself should always be worked, and, owing to its hardiness and powerful root-system, the fruit may be successfully grown on it in situations where on its own roots it would miserably fail.

Hence in purchasing budded lemons of named sorts, a warranty should be required from the nurseryman that the stock is the Bitter Seville.

What has been said of the orange as to planting and general care applies equally to the lemon, with but little difference. Its bark is perhaps somewhat more apt to damage from sun-scalding, and hence it is advisable to train it to a lower branch-growth for self-protection. It is also more prone to make long useless water-shoots, and these are far better pinched out at an early stage than left for the seasonal pruning.

THE CITRON.

The citron is as large a tree as the Bigarrade or Bitter Seville orange, and is even handsomer in appearance. It is very hardy, and will do well throughout the whole region which we have termed the orange belt. The flowers are large and purplish on the outside. The fruit is oblong and rather clumsy in appearance, frequently growing very large and weighing as much as three or four pounds. The skin of the fruit when fit for plucking is of a beautiful waxy, green tint which, if left upon the tree, turns ultimately to a bright clear yellow. There is a very considerable thickness of rind within, which is coarse and only slightly bitter. The subacid pulp is useless, It is the rind alone which gives value to the fruit, being prepared as a confectionery sweetmeat by the process known as candying. The considerable imports of candied citron peel into this Colony show very plainly that a citron grove would pay a good return for outlay and labour, for there is now no lack of manufacturing confectioners here who know how to turn it to the best account. The tree comes fairly true from seed, but should be budded from first-class selected varieties upon the Bitter Seville stock to ensure hardiness.

THE FIG.

Of all fruit trees the fig is perhaps the least particular as to soil. It will give good results in almost any soil capable of cultivation and not hopelessly barren. It has therefore a wide range of usefulness, and one is surprised to find it so sparingly brought forward commercially. Wherever in this Colony the winter minimum temperature never sinks so low as to kill the tree with frost, one may depend upon getting a summer heat quite sufficient to ripen the fruit.

But, of course, the places where the fruit can be grown to a market profit will lie far within this winter extreme. Moreover, not every sort of fig which will grow and bear well will fulfil the conditions required for a first-class *drying* fruit. Many excellent table sorts are of no use for drying purposes, and it is to the production of a first-class dried fig that the grower has to turn his efforts.

Table figs by reason of their softness and speedy breaking up can only have a limited market area. Besides, the fig harvest is apt to come on with a rush, to glut the market, and disappear. Hence low prices induced by every man's anxiety to sell during the few weeks of the season. This peculiarity leads naturally to the device of selecting for the main crop the sorts which are found to dry best, and thus get a permanently valuable return which may without deterioration be held to await a rise of prices.

Besides choice of sorts in the above point of view, it must be understood that the cultivation must likewise be directed to the same end. A drying fig must be large. The little, hard buttons often shown as Cape figs will not do at all, except as dreadful examples of what to avoid. But, with a good average size, there must be firmness of flesh and no excess of moisture. Hence the cultivator has to exercise a wary judgment in the use of irrigation water. It must be run in when wanted by the trees—not simply when the owner's turn comes round. Excess of watering, even when the drainage is perfect, as it very seldom is, tends to produce fruit which dries slowly, shrinks greatly, and becomes tough, or, if the soil has been richly manured, may even cause the trees to run away to mere wood and foliage. These points are here made out to show that if figs good enough for eating while fresh may be grown without intelligent care and thoughtful suiting of means to the end required, it is far from being the case with figs for drying.

The fig tree will get up, if permitted, to a very large size. Californian writers tell us of historic fig trees of 11 feet in circumference of trunk at the ground level, and 9 feet a yard from the ground. Fig groves are described shutting out the sunlight and making a shady twilight as of a cave. We have not these wonders to describe in our newspapers, and it is perhaps just as well we are without them. One occasionally sees examples 20 to 30 feet in height, but they are generally *solitaires* that have grown large through mere letting alone on suitable situations where they have not been encouraged to bulk thus large of set purpose. If at all numerous, such trees would require to be set out over thirty feet apart, and great waste of space would ensue. As with other orchard culture, it will be found that dwarf trees are most economical both of land and labour, and their produce is far more easily and safely brought to the basket. The following is advice from a practical grower:—" Figs are long-lived and strong growing trees, and should be planted further apart than any other fruit trees, especially the strong growing kinds like the Large Purple and White Adriatic. Others, as the White Ischia, are not such strong growers, and may be planted closer, but even they want plenty of room. I would recommend planting from twenty to thirty feet apart. Then fill in between with vines, peaches, plums or quince—something that can be taken out at the end of eight or ten years, or as soon as the fig trees want all the space. The fig and grape do well together, and I should prefer grapes as a filling if the land is adapted to grape-growing."

The fig is mostly propagated by suckers or by cuttings. The treatment of these is precisely the same as that well known and practised here with vine-cuttings. They, however, are more liable than those of the vine to dry out, and should be indulged with some of the extra care which distinguishes the garden from the vineyard. If fine imported varieties have to be dealt with and many plants raised from a small supply of material, the one-eye fig cuttings, with bottom heat and overhead frames, will succeed quite as well as will one-eye vine cuttings. Budding and grafting can also be done, if desired, but quickness and an assured skill are required just as with all other milky-juiced plants. Experienced gardeners, however, rightly discourage these methods of propagating, because of the impossibility of preventing the fig stock from perpetually asserting itself with abundant suckers, and they will probably never be carried out here save to utilize trees that remain persistently barren year after year. Young fig-cuttings which have struck recently are rather tender to transplant. No time, therefore, should be lost in transfer from the nursery to the orchard ground, and special care should be taken in packing for transit.

Growers are not agreed to the height at which young trees should be headed back, but on the whole the dwarfing plan is recommendable. The rampant growth of the fig demands that not more than three leader shoots should be allowed to remain, and these should very equally divide the circle of the future head. Cutting to inside buds in the early shaping is the general rule to correct the somewhat natural sprawling growth of the tree, and when the outline is once obtained pruning is very little required save to cut out here and there an ill-placed branch which crosses its neighbours.

Fig Drying.—There has been very little written respecting the drying of figs in the pages of the *Agricultural Journal.* Hence, though not exactly in accordance with the plan of this little treatise, it may be well to give a few remarks upon the practice as carried on elsewhere.

Supposing the sorts have been selected and grown to perfection. The preparation of first-class dried figs begins with the gathering. No heavy-handed, clumsy person can pick figs—they must be handled delicately if they are to do any good. Every one must have the stem well on, all being rejected that are broken off, leaving it behind on the tree. Pick into a light wire or chip basket hanging on the left arm, for fig-picking requires both hands. From the basket the fruit is laid carefully on the drying trays, all pointing the same way, and none touching its neighbour. In doing this, have a keen eye to the grading for size, and average them to first, second and common as you lay them out. When enough trays are filled to make a full charge for the sulphuring chamber, run them in, set out enough sulphur to burn for twenty minutes, and let them stop in the fumes for one hour. Then remove them into the sunshine on supports of a height convenient for the frequent hand-turning the figs require. Every fruit has to be attended to separately, and when one side bleaches out the other must be turned up. At sundown they must be run under cover. In about three days, with good drying weather, they will be so far dried out that they can be "rolled," as it is called, between the fingers and thumb to equalise the softness of the contents, but the greatest care and dexterity is required for the first rolling lest the skin be broken. After another day's drying, they are rolled again, and will bear a good deal more force. The manipulation ends by pulling each fig out even and flattening it just as the Turkey figs in the boxes appear. In another day, or perhaps two, the fruit is what is technically termed "dry," that is, properly cured for keeping. But the word "dry" does not mean dry in the usual sense. The fig is still soft, yielding fruity, glucose-laden tissue. You can of course keep it out in the sun a week longer, and dry out of it all the moisture. The skin will be as tough as biltong, the flavour utterly gone, and the fig itself fit only for the knob of a walking stick or a coat button. Once over-dried, figs cannot be restored to softness. The curing having proceeded far enough the trays are stacked one above the other in a shed or storehouse for a day or two. The figs are then packed into the "sweating boxes," in which they remain loosely lying for a few days, turning the contents upside-down every day. That is for the purpose of averaging mutually their amount of natural moisture. The next process is packing. The figs are prepared for this by dipping in hot water to which a little salt, a pound to 25 gallons, has been added. The dip is done by means of open meshed wire baskets swished rapidly through the hot liquor twice or thrice. After draining, the figs are laid out on the trays and covered over to keep off flies. In about 18 hours they are ready for the boxes.

Every fig dryer should have his own fancy lining for his boxes; the nattier and more catching to the eye the better. The linings are laid in upon what is to be the top side of the box when opened, and some packers lay in two or three dried leaves of the sweet bay, which we at the Cape might improve upon with the lovely silver tree foliage dried flat for the purpose. The fruit is then pulled and flattened and fitted in with the greatest care, thick and thin end alternately, and carefully turning over any hard stem that might wound the next tier of fruit. When the level of the sides is reached and a little overpassed, say by a full half inch at least, the wood slat that is to be the bottom and an intervening piece of paper are laid on. A dozen or more boxes thus prepared are then put aside under some simple arrangement for an even, springy pressure. This is sometimes effectually done by long laths bent like a bow, one end reaching the rafters overhead and the other pressing on the boxes. In a short time the soft figs yield and mutually accommodate themselves to the decreasing space. When the bottom slat is all but touching the sides it is smartly nailed on with small neat wire nails. Then follows the usual routine of stencilling or branding in the trade mark, the quality and number of pounds guaranteed in the box.

(*To be continued.*)

Minutes of Meeting of Board of Horticulture, 6th June, 1902.

Present :—Mr. C. W. H. Kohler (Acting Chairman), Messrs. D. de Vos Rabie, M.L.A., H. Meyers, J. P. Roux, S. J. du Toit, H. Cloete, C.M.G., R. Malleson, C. Lounsbury, and C. Mayer (Secretary).

The returns of fruit, plants, etc , imported during March to third week of May, showed that 3,584 packages of potatoes, 1,266 of fruit, 18 of plants and 3½ of onions had been landed in Cape Town, and that during February the imports at Port Elizabeth amounted to 108 packages potatoes, 111 of fruit and 9 of plants.

The Secretary reported that the fly netting, missed since its arrival during September last, had at last been discovered and about half of it disposed of to applicants. He was instructed to call for fresh applications in the *Agricultural Journal*, being authorised at the same time to spend £50 in the purchase of fly and bird nettings, if sufficient applications be received.

Cold Storage.—Mr. H. Meyers brought up the question of cold storage at the Docks for fruit intended for export. The matter having been keenly discussed, it was resolved to appoint Messrs. Meyers and Cloete to meet, together with the representatives of the Fruit Exporters' Association, the Harbour Board authorities on Saturday, 7th June, and to instruct the Secretary to inform Government as to the action taken by the Board.

Disposal of Government Farm Produce.—Mr. Van der Byl, unavoidably absent on account of indisposition, wrote to suggest that the Board direct the attention of the Department of Agriculture to clingstone peaches having been exported to London last season from Groot Constantia, and lodge an objection, as the export of that kind of peach would spoil the market. This motion led to a discussion on the question of disposal of Government farm produce generally, in which complaints were made that Government competed too much with the private producer. Mr. Mayer pointed out that, as it was necessary to produce some crops on such farms, an outlet of some kind had to be necessarily found. It was resolved to apply for returns, showing the quantities of fruit, vegetables and trees produced on such farms and how disposed of. With regard to the export of clingstone peaches, the Board urges that, wherever such peaches are exported, they should be labelled clingstone and not merely peaches.

Suitable Stocks for Citrus Trees.—In the absence of Mr. P. J. Cillie, who by letter suggested that the Board protest against certain articles on the question of stocks for citrus trees, published in the *Agricultural Journal*, it was resolved to hold the matter over for the next meeting, to enable Mr. Cillie to personally lodge his objections in detail.

Agricultural Museum.—The accompanying letter of Mr. Monckton's having been read, it was resolved to refer the letter to the favourable consideration of the Department of Agriculture. The question of a fruit register being mentioned in the course of discussion, ensuing on the reading of the above letter, it was suggested that the Board make arrangements for an exhibition of characteristic specimens of different kinds of fruit in Cape Town during the forthcoming fruit season, to collect at the same time all the information exhibitors can give and collate such into a record.

The Secretary was instructed to bring this matter before the Minister of Agriculture and ask that the Board be provided with suitable accommodation for that purpose.

PROPOSAL FOR THE ESTABLISHMENT OF AN AGRICULTURAL MUSEUM.

To the Secretary, Horticultural Board.

SIR,—At this time when a number of farms have changed or will soon change hands, many becoming the property of settlers new to the country who will require all the reliable information which they can get, it appears advisable to urge the establishment of an Agricultural Museum. As there is no Agricultural Board in existence, it is most desirable that the Horticultural Board should enlarge its sphere so as to include agriculture. The various Agricultural Societies exist only for the purpose of holding Annual Shows, and in any case they are not well fitted for the purpose in view.

The Museum should contain, among other things:

1. Specimens of new agricultural and horticultural implements, such as ploughs, harrows, cultivators, drills, sowers, reaping machines, baling presses, fruit boxes, fruit-packing material, pumps for irrigation, simple oil and steam engines, motor transport wagons; dairy requisities, small ice machines; and all kinds of machinery and implements suitable for use in this country. In most cases manufacturers would be glad to supply specimens for exhibition, in the hope that it would lead to sales. And farmers would be glad of the opportunity of seeing all these things collected together in one place, where they could be inspected at leisure, and as often as desired; at present, they only catch a hasty glimpse of a few machines at a show, and in case of wishing to make a purchase they have to make a round of various shops, even then often failing to find what they require.

2. Coloured models of fruit and grapes, full size. Specimens of wool, mohair and ostrich feathers. Models of various breeds of cattle.

3. Specimens or coloured drawings of all plants desirable for introduction or extended cultivation; seeds; specimens of mineral manures, with guaranteed analysis, as supplied by various firms, with prices attached.

4. Lists of plants and varieties of various fruits found by actual experience to be suitable for the different districts of the Colony. Ditto as regards varieties of oats, wheat, barley, etc.

5. Drawings and models of diseased cereals and fruit, showing the different stages, the insect or fungus causing the disease, with directions as to treatment.

Cape Town would be the most suitable centre for a museum, as it is near the chief agricultural districts. But selections of duplicate exhibits, or in some cases models, might from time to time be lent to the various Agricultural Societies for exhibition at their local Shows.

Yours faithfully,

M. J. MONCKTON.

Stellenbosch, March 3rd, 1902.

Industrial School, Stellenbosch.—The discussion on the Committee's report on the Industrial School at Stellenbosch, and the reply thereto of Professor De Vos, was postponed for 12 months, until the country had resumed its normal condition.

Time of Meeting.—Resolved that the Board's meeting in future commence at 10.15 a.m.

Board's Correspondence.—Resolved that the Secretary approach Government with a view of obtaining for Members of the Board the right of forwarding letters on the Board's business and addressed to the Secretary of the Board, on Public Service.

A letter from Mr. Pickstone *re* a memorial tablet to the late Mr. De Waal was read. Resolved that the letter be considered next meeting.

VETERINARY.

Interim Report upon Cattle Disease in Southern Rhodesia.

After careful consideration of the clinical symptoms of sick animals and *post-mortem* lesions of those dead from the disease, and microscopical examination of the affected tissues, I am of the opinion that the disease at present so prevalent amongst the cattle of Southern Rhodesia is what is known as Texas Fever in the United States of America, Tick Fever in Australia, Redwater in Cape Colony, and Tristeza in the Argentine.

Redwater (to use the name in common use in South Africa) is a disease affecting cattle, due to the presence of a parasite in the red blood corpuscle (called *Piroplasma bigeminum*), is not directly contagious from animal to animal, and is spread mainly, if not altogether, through the agency of the cattle tick.

The organism is found in all the tissues of an affected animal (and gains its name from the fact that in one of the stages of its life history it resembles two pyriform bodies approximating at their thin ends), the female cattle tick feeds upon that animal, becomes engorged, drops off and lays eggs in the sand, which hatch out, and these seed ticks, the progeny of the infected female, can, and do, transmit the disease to clean cattle.

Further, an animal which has recently recovered from an attack of Redwater, and is in the South African term "salted" or "immune," can spread the disease by the agency of ticks, that is, an animal "salted" contains in its system the Redwater organism and its blood can communicate the disease to clean stock.

The following summary by Drs. Smith and Kilbourne (American workers) clearly described the nature and characteristics of Texas Fever or Redwater :—

1. Texas Fever is a disease of the blood characterised by a destruction of the red corpuscles; the symptoms are partly due to the anæmia produced, partly due to the large amount of debris in the blood, which is excreted with difficulty, and which causes derangement of the organs occupied with its removal.

2. The destruction of the red corpuscles is due to a micro-parasite or micro-organism which lives within them. It belongs to the class Protozoa, and passes through several distinct phases in the blood.

3. Cattle from permanently infected territory, and though otherwise healthy, carry the micro-parasite of Redwater in the blood.

4. Redwater may be produced in susceptible cattle by direct inoculation of blood containing the micro-parasite.

5. Redwater in nature is transmitted from cattle which come from the permanently infected territory by the cattle tick.

6. The infection is caused by the progeny of the ticks which matured on infected cattle, and is inoculated by them direct into the blood of the susceptible animal.

7. Redwater is more fatal to adult than young stock.

8. The diagnosis of Redwater in the living animal can be rendered certain by microscopical examination where possible.

As Redwater has been known for the past twenty years in various cattle-raising countries, the history, symptoms, *post-mortem* appearances, as well as the part played by the cattle tick in its spread, have been clearly worked out, and when the data of the present outbreak in Southern Rhodesia is compared with those which occurred in Australia, America and the Argentine it can be seen that though certain *post-mortem* symptoms are different in this outbreak the main train of symptoms and *post-mortem* appearances are the same.

HISTORY OF PRESENT OUTBREAK.

Redwater is not a new disease in Southern Rhodesia, isolated (sporadic) cases having occurred during the past ten years, and I am informed that last year cases were met with around Salisbury, in the Makabusi Valley, at Umtali, Charter, and near Bulawayo, and these probably attracted little notice, as isolated cases of sickness frequently occur amongst transport and other stock, and perhaps deaths from Redwater were attributed to Gall Sickness, a disease which the milder form of Redwater may resemble.

These animals, previous to death or salting, were infested with a few cattle ticks (probably the *Rhipicephalus decoloratus* or Blue Tick); these engorged females dropped off, laid eggs in the veld, and the progeny next season attacked clean cattle and so spread the disease. This season has been noted for an increase in the number of ticks; such being the case, no doubt the number of infected seed ticks was very great, and so the present increase in Redwater was noticed. As regards the severity of the present outbreak, many observers have doubted the disease to be Redwater, as the symptoms and *post-mortem* lesions were different to those met with in the Colony, and the *post-mortem* appearances differ in some respects. There can be no doubt that the present outbreak of Redwater is much more severe in type than that usually met with, but that may be due to the amount of infective ticks infesting the animal, as observers have conducted experiments showing that a mild or severe attack of Redwater can be produced by infesting a susceptible animal with a lesser or greater number of infective Redwater ticks.

In the present outbreak it will be noticed the disease appears along the transport roads (up and down which salted cattle have been travelling for years sowing the seeds of Redwater), due to the infected female ticks having been dropped there and their infective progeny having hatched out in immense numbers and attacking the cattle at the outspans, etc. (Each female cattle tick is capable of laying between two and three thousand eggs.)

Southern Rhodesia was practically a clean area. The disease could not appreciably spread from the progeny of the few female ticks dropped from isolated cases of the disease, the ticks being so few in number, but the sporadic cases have gradually been increasing in number, and it only needed a good tick year, like the present, to spread Redwater broadcast over the land. The Argentine maxim "Bad Tick year, Bad Redwater year," is a true one.

The case of the cattle imported from Australia may be mentioned, as I have heard these animals blamed for introducing the disease. These animals came from a district where Redwater is unknown, and so landed clean in Beira; there they were delayed for some time and became infested with ticks, some of them the progeny of infected females; the herd contracted Redwater and died out to two cows, and during their sickness no doubt afforded the opportunity for many clean female ticks to become infested, a state of affairs which helped to produce the present epidemic at Umtali. That many owners of cattle and transport riders have picked up the disease on commonages and outspans can be proved; the incubative period of Redwater when caused by the attacks of infected ticks is about three weeks, more or less, and several cases have come under my notice where the owner has stated that his oxen had been in Salisbury, outspanned on the Commonage, and in three weeks' time from the last town trip he noticed the animals sick; this is particularly noticeable in the outbreak on the Borrowdale Estate. It has been suggested that a mixed infection of Redwater and Rinderpest is responsible for the present loss amongst stock; this is not the case, and for the following reasons:—

1. The clinical symptoms and signs of sickness are different.
2. The *post-mortem* lesions show Redwater, not Rinderpest.
3. Animals salted to Rinderpest contract this disease (Redwater), and in one case animals from the old Rinderpest Bile Station have succumbed to the present epidemic.
4. Blood from dead animals injected into clean cattle produces no signs of Rinderpest.

When I come to deal with the *post-mortem* lesions met with in the present outbreak, I will point out how certain appearances may be mistaken for those of Rinderpest by careless and incompetent observers.

CLINICAL APPEARANCES OF SICK ANIMALS.

The animal stands by itself, dull, with drooping ears, muscular tremors or twitchings are noticeable at shoulders, there is frequently unsteadiness or semi-paralysis of hind quarters, and the animal seems uncertain where to put its feet, bowels may be constipated and dung in hard pellets covered with mucus or there may be violent diarrhœa, frequently of a reddish brown colour, passage of red-coloured urine may be noticed (hæmoglobinuria), but it must be borne in mind that this symptom is not always present in a case of Redwater, and many animals sicken and die from the disease without showing this symptom clinically, or any coloured urine in bladder on *post-mortem*. The percentage of cases of Redwater where hæmoglobinuria is noticed is about 33, and of that 33 many animals may pass blood-coloured urine and it escapes the owner's notice. The temperature is high, frequently rising to 107 or 108, and the animal may die suddenly, and that is after twenty-four or even fifteen hours of visible sickness, or may linger on and die from anæmia in three weeks' time.

POST-MORTEM APPEARANCES.

These vary somewhat from those met with in Redwater in the Colony, and all give the impression that this is a much more severe type of the disease, the lesions being more marked and the tissue changes greater; and one lesion which I will allude to later, viz., the lung lesion, I have never met with before in so marked a degree. If the animal has been sick some days, the carcase will be emaciated, the subcutaneous tissues and fat pale, and frequently yellowish white in colour. Froth from the nostrils is sometimes present, but as there seem to be two types, or rather modifications, of the disease as shown by *post-mortem*, *i.e*, one in which the lesions are those met with in Colonial Redwater, and another where, in addition to those lesions, the respiratory organs are involved, it will be clearer if I describe them separately.

TYPICAL CASE. POST-MORTEM.

Great pallor of subcutaneous tissues, fat and visible mucous membranes pale, and emaciation of the carcase generally. Spleen much enlarged, pulp diffluent and soft, darker in colour than normal, and the white points or Malpighian bodies met with in a healthy organ obliterated by swelling of surrounding pulp. The condition of the spleen is described in an apt simile as resembling black currant jam, and may weigh from ten to fifteen pounds (normal weight two to five pounds).

Liver.—Enlarged, more friable than normal, and of a mahogany colour on section, sometimes showing infarcts (hæmorrhagic spots), due to blocking of the fine capillary blood-vessels with the organisms or with debris and disintegrated matter, as the result of their attack.

Gall Bladder.—Has wall much thickened, and frequently extravasations of blood, and even ulcers, upon its internal mucous lining.

Bile.—Yellowish red or more commonly dark, dirty, yellowish green in colour, containing inspissated particles of bile pigment and much mucus; this bile has been likened to chewed grass in appearance.

Kidneys.—Softened and friable, structure is frequently hæmorrhagic, capsule easily stripped off, infarcts present, both recent, which are dark red spots on outside and in structure of organ, or earlier ones, which are white in colour, roughly spherical in shape, stand up from the surface of organ and softer than surrounding kidney substance.

Intestines.—Frequently congested Peyers patches enlarged and inflamed, sometimes covered with a yellow curpous exudate and gut contains bile-stained mucous, cæcum often affected, diffuse congestion of lining membrane, ulcers may be found at the junction of the small and large intestines (Ileo cæcal valve), the last part of the gut (rectum) shows congestion in striated markings on the mucous membrane.

Bladder may contain normal urine, high coloured ditto, or water the colour of Pontac, owing to the presence of broken down blood which has been passed out by the kidneys and due to the destruction of the red blood corpuscles by the piroplasma.

Stomachs.—First, second and third are normal, the fourth frequently shows general congestion, reddening and thickening of the mucous membrane, ulcers may be present at the edges of the mucous folds and at the pyloric opening of the stomach (*i.e.*, the opening into the intestine), the stomach frequently contains semi-fluid food mixed with blood, and it is the presence of this lesion and the ulcers on the mucous membrane which might cause a careless or incompetent observer or one who only saw the fourth stomach to confound the disease with Rinderpest.

Heart.—Flabby and pale, fat around base of a yellow colour, and little red spots (petechiæ) on outer mucous covering (epicardium), and under inner mucous lining (endocardium) may be small quantity of clear fluid in heart sac (pericardium).

Blood.—Generally paler in colour than normal, and in advanced cases of the disease much diminished in quantity.

THE ATYPICAL CASE.

In addition to the *post-mortem* appearances given above, *i.e.*, the lesions in spleen, liver, kidney and heart (which are always present), the respiratory tract may be the seat of the disease. The lining membrane of the nose (Schneiderian membrane) is purple, dusky red or dull blue in hue, the pharynx ditto, the trachea or wind-pipe filled with a thick froth, and the lungs filled with a clear straw-coloured exudate, and showing much emphysema, so much in some cases as to dissect out the lobules of the lung.

The lungs are heavy, darker in colour than normal, and on cutting into the substance froth and thin clear fluid exude.

A clear straw-coloured jelly-like exudate is around the base of the heart and enveloping the bronchial lymphatic glands, which are much enlarged, and the exudate extends some distance up the neck in the jugular furrow.

Frequently there is a similar exudate around the lower end of the rectum and bladder, and the mesenteric and pelvic lymphatic glands are much enlarged, hæmorrhagic and friable.

In such a case as above you frequently note froth issuing from the animal's nostrils immediately after death, preceded by a clear reddish yellow fluid.

The two modifications of the disease are quite mixed up, and it is quite impossible when an animal is sick and even dying to say whether the lungs are affected or not, and in a span of oxen dying from the disease, half only may show lung lesions on *post-mortem*, or the whole lot may die and not one show anything abnormal in the respiratory apparatus. The number of animals which succumb to the disease and show lung lesions on *post-mortem* I should estimate at from 30 to 35 per cent.

It is worthy of note that the exudation of straw-coloured fluid is preceded by emphysema of the lung, and it is along these emphysematous lines that the exudate travels, the apices and upper edges of the lungs being the parts first and usually affected, in opposition to the idea that it would be the low borders of that organ which would show the exudate first due to the influence of gravity, etc.

I have made special mention of this lung lesion, and stated the facts in a somewhat detailed manner, as I have never before seen such a lesion in any case of Redwater which has come under my notice, and whether it is due to the altitude of this plateau or the severity of the disease, I am unable to say at present.

Microscopical Examination of Blood and Tissues.

All tissues and blood from affected animals have been subjected to microscopical examination, and in every case the causal organism of Redwater has been demonstrated. The form usually seen in Colonial Redwater, *i.e.*, the pyriform stage, is sometimes but rarely met with, and instead I find in the red blood corpuscles strange forms, miniature rods strongly resembling small bacilli; other forms are ring or crescent shaped, and strongly resemble the parasite of malignant malarial fever in man; various other shapes are noticed deviating from the bacillary shape to spherical, and as many as eight of the latter *may occupy one red* blood corpuscle, and quite 80 per cent. of the corpuscles are invaded.

The double pyriform stage has been observed in a small percentage of cases.

In connection with the above description of the forms of the microparasite found in the red corpuscles, Professor Koch, in an official report from Dar-el-Salem under date of 1897, states: "With regard to the forms of pyrosoma and the relations of both it and the full-grown parasite to mild and severe Texas Fever, I have come to different conclusions from American investigators. I found, namely, in the red blood corpuscles of cases which took a severe form, and rapidly proved fatal, strange forms resembling miniature staves, so that one might take them to be small bacilli. These are frequently curved, and sometimes so strong that they form rings, and in that case resemble the parasite of tropical malaria. Between such forms and the pear-shaped form of the full-grown pyrosoma there are a number of intermediate stages. In the severer cases they are found in extraordinarily large numbers, 80 to 90 per cent. of all red corpuscles being invaded. As far as my experience goes, in quite acute cases only the first forms are met with."

This bears out my examination and is another proof of the extreme severity of the present outbreak of Redwater.

CORDONS. RESTRICTIONS TO TRANSPORT.

As it has been conclusively proved that the progeny of infected ticks can and do produce the disease, and that the young of the female ticks engorged on animals salted to Redwater are also infective, and as we know the whole district, and in fact all Southern Rhodesia, is infected with ticks, I do not think any cordon or barrier can be of any avail in keeping back the spread of Redwater, and that such restrictions would only prove irksome without affording any real protection from the disease, and I agree with the Chief Veterinary Surgeon that a quarantine of thirty days be imposed upon all herds showing signs of infection, to start from death or salting of last affected animal.

TREATMENT. CURATIVE.

In Cape Colony, where the disease assumes a mild form, curative medicinal treatment has given good results; a favourite and successful drench recommended by Dr. Hutcheon, M.R.C.S.V., Chief Veterinary Surgeon of Cape Colony, is as follows:—

Calomel...	1 drachm.
Carbolic Acid	1 drachm.
Quinine...	2 drachms.
Raw Linseed Oil	1 pint.

This is a first dose. Mix well and administer with care, the last three ingredients only to be repeated every twelve hours, as long as necessary. If this treatment is to have any value, it must be commenced as soon as the animal appears sick. This drench, I believe, was employed with good results in the Melsetter District at the commencement of the present Redwater outbreak, but as the disease assumed a severe form, proved of no value, and I think from what I have seen that when certain remedies prove of value during the present epidemic the success is due more to the fact that the drenched cattle have had a mild dose of infection than to any very great efficacy in the drenching material.

TREATMENT. PREVENTIVE.

This has been carried out with great success in Australia, America and Cape Colony, and nowadays owners get their clean stock inoculated as an ordinary thing when taking them into the Redwater areas, such as Knysna and native territories. Preventive inoculation against Redwater consists in inoculating the clean susceptible ox with a dose of freshly drawn blood from :—

1st. An animal born on Redwater infected veld and which has run there all its life,

2nd. An animal which has had an attack of Redwater at least three months previous to withdrawal of blood and since run on infected veld,

3rd. An animal which has had a dose of Redwater blood from a recently salted Redwater animal and which after inoculation has a severe rise of temperature in consequence.

I think the onset of the frost will kill the infected agents, viz., ticks and their larvæ, in many parts of the country (Mr. Pounds, Australia, has found that the disease-carrying tick is killed by an exposure to a temperature of three degrees below freezing for seven days). But the prospects for next season must be considered, and I strongly advise inoculation of clean animals with suitable blood during the winter months.

In order to ascertain what is the most suitable form of inoculation, and the most suitable animal from which to obtain blood, and how far our Colonial experience will help us in this outbreak, a series of experiments with that object are being carried out by Mr. Gray, Chief Veterinary Surgeon, and myself, and these will occupy some time, and the results will be submitted in a report at as early a date as possible.

As this form of inoculation is new to the farmers and stock-owners of Rhodesia, it would be most injudicious to advise (without careful experiment) an inoculation as a preventive of Redwater which might prove a failure, thereby damaging their confidence in future preventive measures.

I should like to warn owners of cattle against the indiscriminate inoculation of their clean cattle with bile from animals dead of Redwater, as how far such a material is infective has not been demonstrated.

I should also advise as soon as the period of the year is suitable that certain tracts of veld known to be the haunt of the Redwater infected tick be burnt.

At the present, until some certain mode of inoculation has been proved, farmers whose stock are clean should avoid bringing their spans into markets or outspanning on outspans and commonages, and before and after trekking on public roads it would be worth their while to dress their animals with some mixture to discourage the attacks of ticks, such as grease and sulphur, grease and tar, fish oil, or the carbolic wash recommended by the Chief Veterinary

the disease appears amongst his cattle, I should advise the isolation in separate herds of the infected animals, the destruction as far as possible of all ticks on their bodies (if an animal dies covered with ticks, it would be well to cover the carcase with brush and dry grass, set fire to this and so kill the ticks, thus preventing the engorged female tick from dropping off and laying infected eggs), and the herding on fresh veld of the clean animals; and as soon as an animal is noticed sick it should be taken from the clean herd and herded with the infected herd; and as a means of separating sick from healthy stock the thermometer might be used with advantage, all animals with a temperature of over 104° being considered suspicious. Even if a stock owner, who has the disease break out in his herd, removes his presumably clean animals to fresh veld, he must be prepared to lose animals for the next three or four weeks, as that is the time taken for the disease to show itself when the animal is infected by the cattle tick.

SUMMARY.

The disease at present prevalent amongst the cattle of Southern Rhodesia is Redwater (to give it its South African title); this can be proved by observation of the symptoms, consideration of the *post-mortem* lesions, inoculation experiments, microscopical examination of tissues and blood from affected animals, and the history of the outbreak. The causal parasite of Redwater in its various stages has been found in every case of the disease examined; this in itself is sufficient proof.

It is not a new disease in Mashonaland and Matabeleland, and from evidence put before me I have no doubt that isolated outbreaks of Redwater have occurred in various districts during last season (many no doubt being considered as Gall Sickness).

As this disease depends in the main (entirely as far as we can at present learn) upon the agency of cattle ticks for its spread, all that was required to produce an epidemic was an increase in the number of these ticks, and so supplied the causes necessary to spread the infection.

In conclusion, I should like to add the following remark: One constantly hears the remark, "the disease has spread to a certain place." This disease, Redwater, cannot spread from animal to animal in the sense in which Rinderpest or Lung-sickness spreads; the infection for each lot of animals must be picked off the veld, *i.e.*, by a tick, the progeny of infected females, as that is the only means (except direct inoculation with infected material) at present known whereby the infection of Redwater can spread. And many people have tried to trace certain outbreaks to Salisbury, Charter or Umtali. I fancy most of the outbreaks along the transport roads at least are the result and consequence of the dropping of infected ticks (at some earlier date) from sick or recently salted animals.

That the disease is not directly contagious has been proved again and again; in fact certain clean cattle have been in quarantine with stock dead and dying from Redwater without contracting the disease, and experiments have shown that clean susceptible animals can graze and remain unaffected over veld upon which has been strewn liver, spleen, and portions of the viscera of animals which have succumbed to Redwater, Texas Fever or Tick disease.

WILLIAM ROBERTSON, M.R.C.V.S.,
Assistant Veterinary Surgeon.

Salisbury, 21st May, 1902.

Chronic Indigestion; Failing Appetite; Loss of Condition, etc.

There are no questions more frequently asked by stock owners than the following:—Such and such an animal does not feed well, its appetite is very irregular, and it is falling off in condition, what can I give it? Or the animal continues in low condition, and will not improve no matter how I feed it, what would you recommend?

The dominant idea in the minds of most of these people is that no matter what the cause of this loss of appetite or unthrifty condition may be, the treatment required is some good tonic medicine, or condition powders, as these proprietary specifics are generally called, but to the experienced veterinary surgeon the solution is by no means so simple.

With respect to defective appetite, or delicacy of constitution, this may arise from a great variety of causes such as irregularities of the teeth, injuries to, or sores in, the mouth, on the tongue, or on the maxillary bones. It may also arise from chronic disease of any of the internal organs, or from debility due to the effects of previous disease.

Irregularities of the teeth and sores or injuries about the mouth are dealt with in their proper place, as are also all acute diseases of a pronounced character. The cases of *loss of appetite* for which advice is generally sought are those in which there does not appear to be anything particularly wrong, except that the animal does not feed so well as usual, and is falling off in condition in consequence, or that it feeds all right, but does not thrive.

Chronic indigestion or dyspepsia signifies difficult or imperfect gastric digestion. Any previous disease of a debilitating character may leave the digestive organs in an enfeebled condition, which it may take a considerable time, even with careful feeding, to restore to their normal vigour, more especially when the digestive organs themselves have been the seat of the acute disorder. But every person of experience knows that the principal treatment required for an animal which is recovering from any acute disease is not medicine so much as light, nourishing, easily digested food of a laxative nature, given in small quantities as required. But it is not so generally recognised at least in practice, that debility of the digestive organs, no matter how induced, should be treated in a similar manner. Medicine judiciously administered is of great value, but it is the arranging and regulation of the diet which is the main consideration in the treatment of such cases. Remember that the habitual tendency of all that goes on in the animal body is always in the direction of health. This is the inherent bent of all the vital powers and processes of the animal organism. The object, therefore, of medical treatment is to assist this renewing power of nature, and one of the principal means of doing that is to remove every obstacle to the free action of this restorative force.

In the majority of cases of simple indigestion, or loss of appetite, it is of considerable benefit at the commencement of the treatment to relieve the stomach and bowels by a dose of opening medicine such as a pint of raw linseed oil for a horse; one or two pounds of epsom salts for cattle; and two to four ounces for sheep and goats. For dogs an excellent purgative is castor oil, one or two tablespoonsful according to the size of the dog; or from three to five grains of calomel, followed by a little oil, epsom salts, or jalap, of the latter from fifteen to sixty grains. After having cleared out the contents of the stomach and bowels, a simple vegetable tonic and antacid such as powdered gentian root two drachms, nux vomica one drachm, bicarbonate of soda one ounce, may be given to full-grown horses or cattle twice a day in their food, to younger animals proportionately smaller doses. When there is great debility stimulants may be required such as half-a-pint of whisky or brandy in a bottle of water or thin gruel, one drachm of carbonate of ammonia may be added to the spirit. But the best restorative for a weak stomach is nourishing, easily digested food in small quantities, and the best tonic likewise is good substantial food, and plenty of it, when the animal is able to digest it properly. Mineral tonics, such as sulphate of iron, may be given to an animal with benefit to improve his condition after his appetite has returned, but they should rarely be given to restore a delicate appetite, as is so frequently done. It should be clearly understood also that tonic medicine is not food, and cannot be made to act as a substitute for it. There is no use in giving tonics unless they are accompanied with an abundance of good food.

Loss of condition when the appetite and general health are good.—When an animal eats well, gets plenty of good, wholesome food, but notwithstanding falls off in condition, and looks unthrifty, it is generally an indication of the presence of internal animal parasites or worms.

D. HUTCHEON,
Colonial Veterinary Surgeon.

Yellow Liver, or Congenital Functional Debility in Ostrich Chicks.

With the exception of animal parasites which infest ostriches of all ages, but more particularly young growing birds, the principal disease affecting ostriches is what is known as "Yellow Liver," which is very prevalent at times amongst young chicks from one to six months old, and the mortality arising from it is often very high.

Nature of the Disease.—It is a form of atrophy of the liver, with fatty degeneration of its cells. On opening an affected bird immediately after death, the liver presents a slightly variable yellow colour, and is soft and flabby to the touch; on making a section through it with a knife, the cut surface presents a uniform smooth appearance, and not the slightly granular surface natural to a healthy liver.

The abdominal and thoracic cavities generally contain a variable quantity of a clear serous fluid, the muscular tissue is pale and flabby, and the blood contained in the heart and larger blood-vessels is lighter in colour, and more watery looking than natural. In fact the whole of the appearances indicate that the chick died from *anæmia,* the whole of the tissues being improperly nourished, although the bird may have been supplied with a liberal quantity of food, in fact, the stomach is generally found distended with food.

Before proceeding further it is necessary to explain that the yellow colour of the liver is not directly due to diseased action. The natural colour of the liver of all ostrich chicks that I have examined shortly after they were hatched, is yellow; and this appearance of the liver is not peculiar to ostrich chicks, as the livers of all newly-hatched birds that I have examined present the same colour. This is due to the fact that it is from the yellow yolk that the embryo chick derives its nourishment during the period of incubation, and for one or two days after.

"The yolk-bag is the first formed, and the body of the embryo becomes in great measure detached from it. It contains, however, the greater part of the substance of the yolk, and furnishes a source whence nutriment is derived for the embryo. This nutriment is absorbed by the numerous vessels which ramify in the walls of the yolk-sac." (Huxley.) As the yolk-sac is emptied, it is gradually drawn into the abdomen through the umbilical or navel opening, which then closes over it. In some instances the remains of this sac are found protruding through the navel opening after the chick has left the shell.

The Cause of the Disease.—Many theories have been advanced to explain the cause of this peculiar disease of young chicks, amongst which may be mentioned irregularities in feeding the chicks, and want of proper exercise. It has been considered by some to be a special disease of the nature of typhus fever, while others attribute it to undue exposure of the chicks causing congestion of the lungs and other internal organs. A large number of experienced farmers ascribe the disease to artificial incubation, and the forcing of the parent birds to lay an undue quantity of eggs. With respect to irregularities in the feeding of the young chicks, and the want of healthy exercise, I have little doubt that the habit of cooping up young chicks in a very small space, and stuffing them full of green food while preventing them from obtaining sufficient exercise, would tend to distend and enfeeble their stomachs, more particularly if they were naturally weak, and produce acute indigestion with its accompanying train of evils, such as interference with the free circulation of the blood through the blood-vessels leading to the heart, followed by dropsy, &c. Farmers, as a rule, make the mistake of trying to force food on a delicate stomach, forgetting that although a healthy stomach can stand gorging with comparative impunity, a delicate organ requires to be fed sparingly.

But although this form of mismanagement has been the cause of the death of many healthy chicks, and of many more delicate ones, it is not the principal cause of this particular disease, for chicks have continued to die from yellow liver under all systems of feeding and management, even when allowed to remain with the parent birds on the veld, although a larger percentage of delicate birds can be reared by that method than by any other.

With respect to congestion and inflammation of the lungs, induced through neglect to provide proper comfort for the young chicks immediately after being taken from the nest, or the incubator, or from exposure to cold rain, &c., at a subsequent period, a good many chicks are carried off from these causes during the winter and spring months. But although many chicks die from neglect or mismanagement of such a character, more especially if they are constitutionally deficient in stamina, yet the losses from these causes are small in comparison to those arising from yellow liver.

With respect to special diseases, I have not myself seen any cases of either typhus or typhoid fever amongst ostriches, but I have seen an affection of the throat very closely resembling diphtheria, which attacked several broods of chicks in the Western districts, but it was confined to a limited area, and did not spread. It has no relation, however, to yellow fever.

With respect to artificial incubation, there is no reason why chicks which are hatched by means of the incubator should not be as strong and healthy as those brought out by the natural process, provided that the incubator is properly constructed and carefully regulated. Where, however, the incubator is defective, or lack of skill or care exercised in its management, the health and vigour of the chicks so hatched may be seriously affected. But even if we admit the deteriorating influences likely to arise through errors in the process of artificial incubation, that alone would not account for the widespread prevalence of this disease which frequently occurs, and the heavy mortality which arises from it. But although artificial incubation may not be the direct cause of this affection in the chicks, may it not be the indirect cause? By removing the eggs from the nest to be hatched in the incubator, the breeding birds are induced to continue to lay during the whole season, thereby producing two, three, or even four times the number of eggs which they would naturally lay; and if this forcing system is pursued year after year, it must tend to exhaust the parent birds, and thereby seriously impair the constitution of their progeny. I readily admit that by domestication and artificial feeding, the functional activity of the generative organs of the breeding birds may be considerably increased, providing that all the conditions which are essential to maintaining the healthy vigour of the animal body are supplied, principal amongst these being an abundance of suitable food and healthy exercise. The question is whether the breeding birds which are forced in this manner are, as a rule, kept under such favourable conditions, and supplied with the quantity and quality of food necessary to maintain them in a healthy, vigorous condition? I am afraid that the answer, in a large proportion of cases, must be in the negative. For, although the majority of experienced ostrich farmers no longer keep their breeding birds cooped up in camps, in which there is usually very little natural herbage of any kind for them to feed upon, nearly the whole of their food having to be supplied artificially, yet even at the present time large numbers of breeding birds are very insufficiently fed for long periods, and the artificial food usually supplied under such conditions is not alone deficient in quantity, but its quality is not always the best adapted for maintaining breeding birds in a healthy, vigorous condition.

In the absence, therefore, of any direct evidence as yet discovered of the presence of a special disease, I am strongly of opinion that the so-called yellow liver of ostrich chicks is due more to congenital functional debility, more particularly of the liver and digestive organs, than to any specific infectious disease, and that its origin and cause must be sought for in the feeding and management of the parent birds. In fact, it bears a very close resemblance to that affection of the stomach of young lambs known by the name of bloodpens, which is prevalent in certain seasons.

If this opinion is correct, the remedy will be obvious, although it may not in all cases be so easy of application. I am perfectly well aware that on many farms, more especially during periods of protracted drought, it is a most difficult and expensive matter to provide a sufficient quantity of suitable food to supplement the deficiency on the veld, still it is equally true that Nature will not relax her demands because we are not in a position to comply with them. It is no use, therefore, to look around in search of some panacea to avert the consequences of our neglect or inability to comply with Nature's requirements. Medicines of a suitable character, especially such as supply the deficiency of certain mineral constituents in the food, as salts of soda, potash, sulphur and lime, more particularly the phosphate, are very beneficial; but although these substances undoubtedly benefit the constitution by supplementing the mineral deficiencies in the food, it must be clearly understood that, valuable as they are, such substances are not food, and cannot be made to act as a substitute for it.

Treatment.—The curative treatment of yellow liver in ostrich chicks has not been very satisfactory hitherto. The principal aim should be to limit the quantity of food allowed to these delicate chicks, so as not to over-tax their weak stomachs, and to allow them plenty of healthy exercise; in fact, as already remarked, a larger proportion manage to struggle through the critical period by being turned adrift on the veld, and compelled to forage for themselves, than by nursing and feeding them at home. Still a laxative diet is undoubtedly indicated, and green succulent food is the best for that purpose. They should, however, be allowed only very little at a time to keep their appetites keen, and never satiated.

D. HUTCHEON, C.V.S.

ENTOMOLOGY.

Lime-Sulphur-Salt Wash for Scale Insects.

ITS INSECTICIDAL ACTION, AND POSSIBLE IMPROVEMENTS IN ITS COMPOSITION.

Lime-sulphur-salt wash was first introduced to the Cape, it is believed, by Mr. P. J. Cillie, C. son, of Wellington, who learned of its preparation and uses while on a Government-paid visit to California in 1893. Mr. Cillie, on his return, applied it against the Shot-hole Fungus of the apricot and Leaf Curl of the peach, and later against the White Peach-Scale (*Diaspis pentagona*). His example was quickly followed by other growers and since then the wash has been systematically used both as a winter insecticide for scale insects and as a fungicide by the majority of the progressive Western Province fruit growers. Before Mr. Cillie had introduced the wash, the formula and directions for its preparation had been published by the Agricultural Department in No. 13 of the *Agricultural Journal* for 1892; but no mention was made of the uses to which it could be put and doubtless all readers soon forgot about the matter.

ORIGIN AND HISTORY OF THE MIXTURE.

Some of the most valuable of insecticides have been originated by or have been adopted from other uses by farmers. Lime-sulphur-salt wash is a notable example. A solution made by boiling lime and sulphur together came into use as a fungicide for surface mildews in France in 1851 (Lodeman's "Spraying Crops"), and lime-sulphur sheep dip is said to have been introduced into Australia "forty or fifty years ago" (see *Agricultural Journal*, Nov. 23rd, 1899). Until the late eighties, however, there seems to be no record of the value of such a compound against scale insects. Matthew Cooke, at one time the "Chief Executive Horticultural Officer of California," made no mention of the compound as a tree wash in his "Injurious Insects" published in 1853, though he dealt in detail with its use as a sheep dip; and there is no word about it in the "First Report of the State Horticultural Commissioners of California," issued in 1832. Lodeman in 1896 says of it "as fruit trees (in California) began to drive out the sheep the application of the compound was transferred to the trees." But whoever first demonstrated its value against scale insects and whenever this was, the sheep dip with the addition of salt and extra lime was in common use in California by 1889. The State Board of Horticulture formally adopted it as an officially recommended winter remedy for scale insects on deciduous trees in June of that year. Two years later, the Entomologist of the Board, Mr. Alexander Craw, in an official pamphlet entitled "Destructive Insects," wrote: "This remedy (lime-sulphur-salt wash) has been extensively used for the past three seasons, and has proved a good fungicide as well as an insecticide," and he then proceeds to give the formula which up to now has remained the one most generally followed, namely, 40lbs. unslaked lime, 20lbs. sulphur, 15lbs. salt, and 60 gallons water (about 50 imperial gallons). In 1890, Mr. D. W. Coquillett, then a Pacific Coast Field Agent of the United States Department of Agriculture, became interested in the remedy. He made a number of tests with it against the San José Scale (*Aspidiotus perniciosus*) and concluded that it was inferior in efficiency and ease of preparation and application to resin wash, while it was equally expensive. (Entomological Bulletin 23, 1891.) With the object of determining the effective agent in the mixture he made comparative trials with the complete wash, salt and lime, sulphur and lime, lime alone, and sulphur alone, and came to the conclusion he summed up as follows: "It would appear that neither lime, salt nor sulphur when used separately are effectual in destroying the San José Scale; and the same is true in regard to any two of them when used in combination, except, perhaps, the lime and sulphur, which have not as yet been sufficiently tested." Further experiments during the following year, however, strengthened his opinion that all three ingredients were necessary and that resin wash was the preferable insecticide. (Entomological Bulletin 26, 1892.)

The adoption of lime-sulphur for the suppression of scale insects is so natural a step from the use of the combination as a scab eradicator that farmers in various parts of the world doubtless knew something of its use as a tree wash before it became the basis of lime-sulphur-salt mixture. Farmers here and there through Cape Colony before the advent of the cyanide gas remedy were in the habit of washing their scale infested citrous trees with lime-sulphur, and the practice seems to have been an old one. Sometimes a solution was especially prepared, but more often and preferably that which had been used for sheep dipping was employed. The trees were deeply stained and a large portion of the foliage might fall, but the treatment was on the whole decidedly beneficial in the case of very badly infested trees. A solution diluted to such an extent that little or no injury to citrus foliage resulted from its application was employed by some fruit farmers, but was said to give far less satisfactory results so far as the scale insects were concerned.

The writer had no experience with lime-sulphur-salt wash further than the preparation of a few experimental boilings prior to his coming to the Cape in 1895. However, the efficiency of the wash in this climate as evidenced by Mr. Cillie's sprayings in Wellington impressed him immediately after his arrival; he at once became a persistent advocate of the mixture and soon succeeded in greatly increasing its use. In Mr. Cillie's home orchard it chanced that one side of a peach tree had been well sprayed whilst the other side was left untouched, the stain left by the wash showing plainly what branches had been treated and what not. The foliage had just appeared at the time of the writer's first visit to the place, and as it happened Leaf Curl was that year very prevalent. Mr. Cillie called attention to the partly sprayed tree, and no better demonstration could have been desired on the value of the wash against Leaf Curl. The unsprayed portion bore very few unaffected leaves while the sprayed portion bore very few affected ones. Numerous similar illustrations of the same nature have since been observed.

Peculiar Action on Scale Insects.

As seasons came and went and the writer's acquaintance with lime-sulphur-salt mixture broadened, he became much puzzled by the peculiar action of the insecticide. It was noticed that however thoroughly the trees were sprayed much live scale could be found for two or three months afterward and still practically none be found later than mid-summer. Two sprayings, one in mid-winter and one just before the buds unfolded, were observed to be very little if any more efficacious than one applied at the latter time. The Californians laid great stress on using the full weight of unslaked lime and prolonged boiling, and attributed failures to neglect in these respects; yet at the Cape it was seen that results apparently as good as the best followed when ordinary, kiln-slaked Cape lime was used and the cooking carried on for little more than half the usual time as when the same weight of highest grade, unslaked lime was taken and the boiling continued for the full time. Gradually the hypothesis became unavoidable that the mixture was essentially an indirect insecticide, affecting the progeny of the scale insect (*Diaspis pentagona*), to which it was applied at the Cape much more than the parent insect; and that the essential principle was some ingredient or ingredients that remained or became active on the trees long after the application. Mr. Coquillett's experiments and Californian experience had before seemed to preclude the necessity for tests with variations of the standard wash to determine if all the ingredients were required and if they were present in the most suitable proportions, but viewed in the light of the new idea the subject demanded investigation.

The opportunity for experiment came with the season of 1901. The Assistant Entomologist, Mr. C. W. Mally, has a genuine aptitude for field experimental work, and he was detailed to test the ingredients of the mixture in various combinations. A number of tests were made on scale infested trees at the Government Wine Farm, Constantia, in the Cape district, and at Mr. Henry Meyer's farm, Vrede en Lust, at Simondium in the Paarl district, by him, and these throw most interesting and important light on the problem. Other insecticides were tested in parallel series, and it may be here noted that the lime-sulphur compounds proved decidedly superior in insecticidal value to summer and winter resin wash, quadruple and weaker strengths of paraffin (kerosene) emulsion, and various strengths of whale oil and soft soaps in solution. A full report on all the experiments has been submitted for publication in the Entomologist's annual report for 1901, and it is here desirable to present only a brief outline of the lime-sulphur series and to discuss the results obtained.

EXPERIMENTS TO DETERMINE ESSENTIAL INGREDIENT.

Seventeen combinations and variations of the ingredients of lime-sulphur-salt wash were tested. These included (1) complete washes with the lime ingredient respectively 40, 25, 20 and 15 pounds to 20 pounds of sulphur; (2) lime and sulphur prepared sheep dip diluted respectively with 5 and 10 parts of water; (3) complete wash prepared from the sheep dip; (4) lime and salt without sulphur; and (5) lime only. The preparation of all the washes was in accordance with the general directions published in the Entomologist's report for 1896, which are the directions generally followed. The proportions of the ingredients, except so far as one or more were omitted or varied for the experiment, were the usual 40 pounds of unslaked lime, 20 pounds of sulphur, 15 pounds of coarse salt, and 50 imperial gallons of water. The cooking was done in an open iron pot, and the loss in quantity of liquid by evaporation made good frequently by the addition of boiling water from a second pot. Four bearing peach trees, specially chosen because of their infested condition, were used in each test. Owing to Martial Law restrictions and the long distance of the place from town, the Simondium tests were not as closely watched as those at the Constantia orchard, but visits of sufficient frequence were contrived to corroborate the results observed at the nearer place. The Constantia farm is only about twelve miles out, nine by rail and the rest over a good cycling road; here was tried four trees with complete wash of 40-20-15-50 formula, four with complete wash of 20-20-15-50 formula, four with 1-5 sheep dip, four with 1-10 sheep dip, four with 40-0-15-50 lime and salt, and four with 40-0-0-50 lime only. Two intermediary rows of four trees each were left unsprayed to serve as controls. The sheep dip in five parts of water was estimated from the official Departmental analysis to be equal in sulphur content to the ordinary complete wash. At Simondium all the complete washes were tested in duplicate, half being boiled thirty minutes after adding the salt and lime mixture and the other half being simply well stirred to incorporate these late added ingredients.

ANALYSES OF INGREDIENTS.

Various analyses in connection with the experiments were made by Analyst Lewis of the Government Analyst's Department. The lime used was unslaked shell lime obtained in sealed tins from Maitland Strand. It analysed 76 per cent. calcic oxide, 20 per cent. calcic carbonate, and 4 per cent. sand and other impurities. Several analyses were made of the soluble lime-sulphur compounds produced. These averaged 1 part (by volume) of lime to 1·80 parts of sulphur as first formed, but when the lime and salt mixture was added to complete the wash the ratio fell to an average of 1 : 1.60 and was not restored by the half hour's extra boiling. The sheep dip was from two of ten drums, samples out of all of which had shown the average ratio of lime to sulphur to be as 1 : 2. The addition of lime and salt to make a complete wash from the dip decreased the ratio to 1 : 1.5 The dropping of the ratio was at least in part due to calcic oxide from the newly added lime coming into solution. Samples of the lime-sulphur compounds kept a month in tight stoppered bottles over sediment from the cooking pot did not alter in dissolved lime and sulphur content.

The spraying was all very thoroughly done, so thoroughly, indeed, that not any bark at all was left unstained. The Constantia work was performed August 13th to 17th, and the Simondium, August 27th to 29th. No meteorological observations were kept for Simondium, but in his full report Mr. Mally gives the Constantia rainfall records from the date of spraying to January 3rd, 1902. Slight rains of one fifth of an inch or less fell on August 21st, 22nd, 23rd, 24th and 25th, September 1st, 2nd, 3rd and 7th; and a heavy rain of 1 44 inches fell on September 8th. Altogether a fraction over ten inches of rain fell during the period of observation, with no single fall greater than that of September 8th.

EFFECTS OF SPRAYING ON THE SCALE INSECTS.

As was anticipated there was little perceptible effect on the old scale insects infesting the trees. Eggs were developed, laid, and in due time were hatched. Young were found crawling about on October 1st on the treated as well as the untreated trees. But as time wore on, it was observed that all the young on the lime-sulphur sprayed trees shrivelled, while those on the control trees formed scales and increased in size. Some twigs of the sprayed trees were literally encrusted with the shrivelled remains of the young insects in November. On the lime and lime-salt sprayed trees the young settled without any apparent difficulty, and seemed to show no special preference for patches where the lime coating had peeled off; while, on the other hand, on January 4th *no surviving young at all were to be found on any tree sprayed with the washes containing lime and sulphur in combination.* The protection given by the dilute sheep dip, indeed, seemed as complete as that given by the standard complete wash.

WASH FROM POOR LIME.

Sufficient infested trees were not available for testing washes made with ordinary, kiln-slaked lime; but at Simondium, Mr. Mally found a bag of such lime left over from the previous year, and to determine if it was still good for making a wash he mixed 2½ pounds of it with 5 pounds of sulphur and boiled these in 2½ gallons of water. The sulphur dissolved quite readily. After boiling had proceeded a half hour a sample of the compound was taken, and an hour later a second was dipped out. Mr. Lewis determined the lime-sulphur ratio in both of these and found it to be 1 : 2·07 in the first and 1 : 2.10 in the second. From this simple test it seems evident that ordinary, kiln-slaked lime will form sulphides readily even after having been kept in bags for some time, and that prolongation of the cooking for an extended time after the sulphur has all dissolved is needless. For comparison with the wash from long slaked lime, a batch was made from 5 pounds of fresh lime, weighed before slaking, with 5 pounds of sulphur in 2½ gallons of water. The solution was sampled after boiling had been carried on an hour and a half, and on analysis the ratio was found to be 1 : 1.80, the same as when the customary proportion of 10 pounds of lime and 20 of sulphur was taken, which it should be noted is decidedly lower than in the compound formed with half the quantity of ordinary, kiln-slaked lime.

INFERENCES FROM EXPERIMENTS.

The natural inferences from the experimental sprayings and from the supplementary boiling tests are:

(1) That the lime-sulphur compounds are the effective agents in lime-sulphur-salt wash.
(2) That ordinary, kiln-slaked Colonial lime may be safely used to substitute an equivalent amount of unslaked lime.
(3) That it is unnecessary to continue the boiling after all of the sulphur has gone into solution, and that no extra

boiling is needed when the salt and additional lime mixture is added.

(4) That one spraying only is necessary, and that it should be applied with great thoroughness and as shortly as possible before the buds unfold.

It moreover seems very probable that frequent light rains, such as were characteristic of the past season, are favourable and perhaps necessary for the best results, whilst heavy, long continued rains tend to weaken the action of the wash by too quickly leaching away the essential soluble elements. Heavy dews are probably beneficial like light rains. Mr. Mally says in accounting for the destruction of the young scale insects: "The only explanation that suggests itself is that the soluble compounds were the essential part of the mixtures used, and that the frequent light rains, though not heavy enough to remove them, dissolved them sufficiently to destroy the young insects before they could produce the protecting scale covering. The dead young insects vary considerably in size, suggesting that the larger ones emerged soon after one rain and the smaller ones just before the next." Turning to the records of Mr. Coquillett's experiments in California, one sees at once from what his rather unfavourable results arose. He reports a rain lasting twenty-four hours to have followed within a day of his 1890 application of lime and sulphur; and one of two and one-half days' duration followed two days later by "a long continued rain" after his 1891 washes had been on the trees only four and a half days. If the action of the insecticide is principally on the young of the San José Scale as it is on the young of the White Peach-Scale, then it is small wonder that after such rains Mr. Coquillett was led to consider resin wash the more efficacious insecticide.

Mr. Mally's results, it has been stated, were seemingly the same for all the lime-sulphur washes, each and every one affording entire protection. This bespeaks volumes for the extreme thoroughness of the applications, but it may be questioned if the season were not abnormally favourable, and if in seasons of heavier rains the complete wash would not prove much more valuable than lime-sulphur solution alone. Mr. Coquillett in 1890 said he thought it very probable that the lime-sulphur gave the wash its insecticidal property, while the extra lime and salt gave its stability by rendering it less liable to be washed away. In the following year this opinion was much modified and he thought all three ingredients indispensable, but now it seems as if he were right at first. But admitting that the extra lime and salt do hold the wash longer to the trees through heavy rains, their addition is evidently a matter for local consideration. In localities where the rains are not apt to be heavy, the lime-sulphur solution alone will probably be found quite as efficacious as the complete wash both as an insecticide and as a fungicide; while where heavy rains are likely to fall after the spraying and before the young scales are out, say November 1st, it is probable that additional lime and salt, varying from a little only to as much as the standard formula calls for, according to circumstances, may be sufficiently advantageous to offset the extra expense and trouble. The tendency in California, dictated by experience presumably, has been to increase the quantity of lime; but there are probably many places in the Colony where the simple lime-sulphur solution will, as already stated, prove all-sufficient. The simple solution is much cheaper than the complete wash and is a much less disagreeable substance to apply; being wholly soluble it requires no stirring, is far less wearing on the spraying apparatus, and does not clog the nozzles. Therefore it is to be preferred wherever it can safely be used as a substitute. It is amongst the plans of the Entomological Office to continue experimenting during the coming and succeeding seasons, and in time it is hoped to be able to make definite statements on the comparative merits of the complete wash and its lime-sulphur ingredient alone in place of the present conjectures. Meanwhile the recommendations of the Office must remain on the following lines:—

RECOMMENDATIONS.

Lime-sulphur-salt wash is the most efficacious liquid insecticide of which we know for the suppression of the White Peach-Scale. It is also decidedly efficacious for other scale insects and is highly efficient as a fungicide for the Leaf Curl of the peach and the Shot Hole Fungus of the apricot and other stone fruit trees. The application of the wash should be extremely thorough, and made shortly before the buds burst to be of greatest service. The present most popular formula is:—

Unslaked lime	40 pounds.
Sulphur	20 „
Coarse salt	15 „

with water to make 50 imperial gallons.

Ten pounds of the lime are slaked, using hot water preferably and slaking slowly; and into the paste thus formed the twenty pounds of sulphur are slowly stirred, and the whole mass then worked into about fifteen gallons of water in the cooking pot. Or the sulphur is rubbed to a smooth paste in a little water separately and the two ingredients added one after the other to the bulk of water. The water had best be boiling when the lime and sulphur are added, and the mixture should be kept boiling and should be frequently or continually stirred until all or practically all of the sulphur goes into solution. The liquid should then be reddish brown in colour. The cooking may take only forty minutes or thereabouts or may, under some circumstances, take nearer two hours. The quantity of liquid should be kept approximately constant during the cooking by the addition of water to take the place of that lost by evaporation. The remaining thirty pounds of lime are slaked in a separate vessel and mixed with the salt; this salt and lime mixture is next added to the lime-sulphur compound, water added to make the full quantity, the whole thoroughly stirred and strained to remove coarse particles and sand, and the mixture is then ready for application to the tree.

Dissolved sulphur is destructive to copper; hence the mixture should not be brought in contact with copper vessels, either in the cooking or subsequently. It is best to cook it in an iron pot and to spray it from a wooden vessel, as a barrel. It is injurious to plant foliage at this strength and should only be applied to trees while they are out of leaf. Good kiln-slaked lime may be used in place of unslaked lime; owing to the water content of the former its lime value is only about three-fourths that of the latter. The quantity of lime may be varied but not less than seven pounds of unslaked, or ten pounds of slaked, should be used with the twenty pounds of sulphur. The omission of all over about seven pounds of lime and all the salt leaves a spraying compound the value of which may be equal that of the complete wash under some circumstances of climate and season, but until all doubt is removed it is advisable for the general public to adhere to the complete wash.

CHAS. P. LOUNSBURY,
Government Entomologist.

Paraffin Emulsion with Resin Wash for Red Scale.

In a recent letter, Mr. E. Tidmarsh of Grahamstown, the veteran nurseryman of the Colony, writes: "We constantly spray small orange trees with paraffin emulsion diluted with resin wash, both normal strength, and decidedly opine it to be the best mixture we know of for the purpose." Mr. Tidmarsh has had wide experience with washes for the Red Scale, and fruit growers who have young orange and lemon trees infected with the scale might do well to test the mixture of washes which he suggests. Fumigation can be used, of course, for small trees as it is for large; but there is danger of over-dosing small trees done singly by the gas treatment, and because all parts are easily reached, spraying can be depended on to keep the scale in subjection in their case. It may be here mentioned that to Mr. Tidmarsh belongs the distinction and credit of emulsifying paraffin oil (kerosene) with soap for use as an insecticide some years before the Americans learned to make such a wash. Directions for preparing an emulsion were published by Mr. Tidmarsh in one of the Grahamstown papers about thirty years ago.

STOCK FARMING.

Quality in Mohair.

We are indebted to the *Midland News* for the following expert report on sample fleeces—weight *versus* quality of fleece—by Mr. S. B. Hollings, Bradford, dated 2nd ultimo :—

The very vexed question of quality in mohair continues to command a good deal of attention in Yorkshire manufacturing districts, and especially among Bradford mohair merchants and spinners. So long as there continues to be a heavy weight of material coming into this market from Cape Colony and from Angora goat breeders who profess to grow a style and quality of mohair equal to Turkey, but not acknowledged as such by those who have the mohair to use, so long will quality and breed of the staple continue to meet with the strong disapproval of users. It is all right enough for growers to produce a class of hair according to their ideas, but so long as the hair continues to weight the market, is only suitable for making secondary fabrics, and commands a less price than even Turkey average, so long will that mohair be regarded by manufacturers and spinners as being somewhat short. That is exactly the position which Cape mohair occupies to-day, and for that reason I desire once more to lay a few facts before responsible breeders.

SAMPLE FLEECES CONSIDERED.

It will be remembered by regular readers of the *Midland News* that last year one of the very best Angora goat breeders at my suggestion sent to the Wool Section of the Bradford Chamber of Commerce six full sample fleeces of mohair, along with three sample fleeces of "kids." I need not mention the name of that breeder, suffice for me to say that the character of stock he is carrying ranks among some of the very best blood in the whole of South Africa. The fleeces were duly received, inspected by several well-known merchants and mohair spinners, one of the best dealers in the trade being deputed to send a reply, which was duly dispatched. I expected that the *Midland News* would obtain a copy from the Port Elizabeth Chamber of Commerce, which had the thing in hand, but that report I never saw. Whether it appeared or no I venture now to direct the reader's attention to that report, and if it was printed in a past issue of the *Midland News*, well, even a second reading of the report will provide food for serious thought. The following is the official reply, which is worth more than passing notice :—

REPORT ON SAMPLES OF MOHAIR RECEIVED FROM THE PORT ELIZABETH CHAMBER OF COMMERCE.

No. 1.—Good length, bright, well-bred, but very strong. Altogether unsuitable for the present demand.

No. 2.—Good length and colour, finer hair than No. 1, but rather kempy, and not so well-bred.

No. 3.—Clean, well-bred, good length, but altogether too strong.

No. 4.—Fair length and colour, very strong, not sufficient to curl in staple.

No. 5.—Good length, well-bred, but too strong. Part of the fleece slightly tinged.

No. 6.—Good length, bright and well-bred, but altogether too strong.

These six fleeces are all well got-up, being clean and free from objectionable matter. With the exception of No. 2, they are all free from kemp. No. 2 is not well-bred, but it has a little more quality than the others—the objection is the kemp. The style of hair of all six fleeces is not at all suited to the present demand, in fact the present price of kid hair shows that it is quality that the trade wants, and not these big, strong fleeces.

KIDS.

No. 1.—Very clear, well-bred, and nice quality. Good curl in staple, but not full-grown.

No. 2.—Good hair, well-bred, and a fair amount of curl in staple; not quite as fine as No. 1.

No. 3.—Well-bred, fair length. Not so fine as Nos. 1 and 2, and rather wasty.

These are three good samples of kid, but are rather short in staple. No. 2 is the most valuable sample.

DISSATISFACTION EXPRESSED.

No unprejudiced person can read the above report without noticing that every fleece shown apart from the kids comes in for strong adverse criticism, and in no single instance is it stated that the class of hair sent is altogether suitable to meet the present demands of the mohair trade. I readily grant that during the past few years fashion has decreed that nothing but the finest classes could be used to serve the best purposes of the trade, but one would have thought out of six picked fleeces one at least could have been selected as a standard for imitation. The language is indeed significant, "All six fleeces are not at all suited to the present demand," and it is exactly here that the "missing link" has to be found, and if possible put in to yolk together the Cape mohair industry with what is required by Bradford manufacturers.

THE MISSING LINK.

The writer of the above report explains clearly what is the missing link when he says "it is quality that the trade wants, and not these big, strong fleeces." More than once in the past have I written upon this subject solely in the interests of growers, but of course, when other interested parties have inculcated a different gospel to that of quality and fineness of fleece, insisting on big, bulky fleeces, then some confliction of interests has arisen. Let readers clearly understand that neither I nor any one single Bradford mohair user objects to weight in fleece so long as quality and fineness of fibre are maintained. But are these two characteristics compatible with big, heavy, bulky fleeces, either in wool or mohair? In wool, every practical breeder knows it is not, and I am certain that with such a delicate animal as an Angora goat, it is impossible to combine a big weight of fleece with a good passable degree of quality. The fleeces from Cape Colony noticed above are from one of the best breeders of "non-oily" goats, and if the hair from this class of goats is deficient, then what can we expect from those flocks which are known to be of a very oily nature? Truly we might ask, if Cape breeders do these things in a green tree, what shall be done in the dry? I am well aware that one writer has freely quoted Mr. Amos Crabtree's well-known statement concerning weight of fleece, but I here say, once and for all, that while any rational minded man readily admits that this is a growers' question, still the way Mr. Crabtree's remarks have been used is altogether unwarranted. His words have been employed outside their true setting, and there is no keener advocate in Bradford to-day than Mr. Crabtree for quality and fineness in Cape mohair. For the past half-a dozen years Mr. Amos Crabtree has been the pioneer for length and quality in Cape mohair, and both in public and private he has stated most strongly and emphatically that Cape mohair is "too strong" to meet the wants of the best part of the trade, and that Cape mohair is still far below that grown in Turkey. I am stating a positive fact when I affirm that there is not a single user in Bradford who will take Cape when he can obtain Turkey, while never has Cape firsts been worth as much in price as Turkey average, ne'er tell of super Turkey. This alone proves that Cape mohair is not as fine as Turkey, even if there was no other reason to prove what I am saying.

Real Meaning of Quality.

A close analysis of the above report shows that five out of the six fleeces sent for examination are all styled "too strong," the remaining one being spoken of as "not well bred," which in other words implies that it was a little wanting in both style and character. When the words "too strong" are used in connection with either wool or mohair their real meaning does not apply to the strength of the staple, but to the fineness, quality, and spinning property of the fibre. A very fine stapled wool may be very tender in staple, but this is always spoken of as being "weak," while a fine quality wool that is firm and unbreakable is always spoken of as being "sound" but never "strong." The words "too strong" are always used in reference to the quality of raw material, and the fact that these samples of mohair are styled "too strong" indicates at once that they were wanting in quality. Any man who saw the sample fleeces and compared them with good average Turkey could see at once they were not so fine. These Cape fleeces were very well grown, good length, nicely skirted, well-bred mohair, but had there been a finer quality, then, and only then, could they have been described just what users need. I hardly think that Cape mohair growers have as yet a full and comprehensive idea of quality as they should have, and so long as weight continues to be the first plank in a breeder's programme, so long will they miss the mark. The very fact of the last three Turkey clips being altogether consumed while that from the Cape has been going a-begging for customers, with thousands of bales still in the hands of merchants here, all goes to prove that there is something radically wrong when Turkey is taken at the expense of Cape firsts. I expect that every practical mohair grower fully understands that quality determines the spinning property of either wool or mohair, and a thick, strong fibre cannot possibly produce a fine yarn. A spinner can produce a thick yarn out of fine stuff, but it is impossible to produce fine yarns out of thick fibres; in other words, a quality can be spun down, but it can never be spun up to a longer length or a finer degree of fineness than the fibres will go. Or, to put the matter another way, it is possible to spin Cape firsts to the thickness of yarn produced by Cape winter, but Cape winter can never be spun to as long a length as Cape firsts.

WEIGHT OR QUALITY—WHICH ?

The question of quality in mohair is one of vital importance to every Angora goat breeder in the Midland Districts, and one which I venture to think will have to be looked at more studiously and thoroughly in the near future. With the war on, Bradford users have let the thing slide as much as possible and winked at other deficiencies so long as they could supply their most pressing needs from Turkey, but if Cape breeders are to occupy the first position in the future, then this question of a better quality will have to be considered and fully dealt with. I recognise the fact that quite possibly the most suitable mohair for Bradford spinners may not be the most profitable quality of hair to grow by Midland goat breeders. That to my thinking is a matter for serious consideration. At the same time the best and most valuable hair should be aimed at consistent with a reasonable weight of fleece, but I am stating a positive, undeniable and absolute fact that all Bradford users with not a single exception are of the opinion that Midland goat breeders are paying more attention to weight of fleece than quality of fibre, and that Cape mohair, generally speaking, is 15 to 25 per cent. below the average quality of Turkey. What I ask is, can a *via media* be discovered which will bring to breeders a paying price, and at the same time satisfy the needs of manufacturers, thus removing the stigma that at present attaches to the Cape mohair.

A TIME FOR ACTION.

The present standing of the article proclaims to the world that something is needed to give Cape mohair a better footing among consumers, and now that we have got a longer length, speaking generally, it is for responsible parties to set the pace for the rank and file by doing all they can in quality improvement. I am certain of this, that in the near future those breeders who can show a good quality fleece and an average weight will be patronised the best by users. Big, strong, wiry fleeces with more bulk than quality are not wanted, and those who are breeding for this style of goat are on the wrong track. Quality in either wool or mohair has always ranked as the first essential in a good fleece, and always will do, hence Midland goat breeders are serving their own interests the best by looking first to quality in their flocks.

Ostriches in Australia and New Zealand.

In a visit to Hawkesbury College, New South Wales, a contributor to the *Australian Agriculturist* writes:—

"Some time since the authorities decided to add ostriches to the farm, and hearing that Mr. Thompson had been successful in raising the first birds hatched in N. S. Wales, we paid a visit there during the past month.

The South African Government being desirous of making ostrich farming as much a monopoly as long as possible, have just placed an export duty of £100 on each bird, and presumably this will raise the value of all birds elsewhere by a like amount.

The pair of adult birds now at the Hawkesbury College were obtained from South Australia, and cost £50 each, so that if we add the S. African duty, we arrive at some £300 as the value of the pair.

The birds are a fine up-standing pair, the male with black body feathering, with white under the wings and grey behind; the hen being entirely grey—this we believe is the rule in the two sexes.

It was interesting to hear the account of Mr. Thompson's experiences with his charges, for needless to say that he was quite new to the work, and though to strangers the male especially shows considerable signs of hostility, he manifests much friendliness towards Mr. Thompson, endeavouring to swallow his watch chain, or making playful grabs at the brim of his straw hat, always keeping however a watchful eye on strangers and standing on guard between them and his mate.

It appears to be one thing in ostriches to have a pair and quite another thing to mate them, and for a long time after their arrival at the College farm the hen was very shy, and resisted all advances from her companion, and it required no small amount of coaxing from Mr. Thompson before he could get them to be friendly and enter into matrimonial alliance.

The birds have a fine well-grassed run of several acres with young trees and sandy patches, which would appear to form an ideal ground for them, and on such a run they go a long way towards feeding themselves.

The birds are young, supposed about three years, and when Mr. Thompson found an egg—though with broken shell—amongst the grass, of course he entertained hopes of soon being able to raise some young stock. Various eggs were found, but were most likely infertile, for though the cock made several nests the hen declined to occupy them, until the efforts to mate them succeeded. Sixteen eggs had been laid altogether, but the hen sat upon eight of which two are supposed to have been clear, and from the balance six handsome young ostriches came out.

These are a very pretty sight, being with their fluffy, brown, speckled feathering the exact counterpart of each other, and though only some six weeks old there can be no doubt that they are strong promising stock. They move with a graceful carriage, usually in a compact body in almost military formation two abreast and three deep. Even the young birds draw largely upon the grass and grass seeds for their food, though they eagerly eat cracked maize with their parents.

Mr. Thompson is to be congratulated on his success, especially as he has had to find out for himself practically all he knows.

Mr. Valder, the Hawkesbury College Principal, has just returned from a visit to New Zealand, where he saw a very successful ostrich farm, and as our own climate should be as favourable as that of New Zealand, if not more so, we may hope for a good future for the ostriches at our College farm at Richmond. The value of a crop of feathers from a male bird is said to be about £15, those from the hen being of less value. The feathers are taken, we understand, at the natural moulting season and leave the bird easily."

Artificial Manures.

The annexed list showing the agents from whom the various artificial manures may be obtained, and the current prices, is publiseed for the information and guidance of agriculturists.

Full particulars as to the composition of the respective fertilizers can be obtained on application to the agents; and attention is also invited to the analyses published in the *Agricultural Journal* of 9th January, 2nd April and 11th June, 1896; 30th Sept., 1897; 27th Oct., 1898; 13th April, 6th July, 1899 and 18th July, 1901.

LIST OF FERTILIZERS.

Attwell & Co., Cape Town. (Agents for Alex. Cross & Sons, Ltd., Glasgow.)	Special Root Guano ..	£6	10	0	per ton of 2,000 lb,
	Potato and Grain Guano ..	8	5	0	" "
	Nitrate of Soda	12	0	0	" "
	Superphosphates 39/40 per cent ..	6	0	0	" "
	Scotia Basic Slag (cont. 30 per cent. Tribasic Phosphate of Lime)	4	15	0	" "
	Sulphate of Ammonia ..	0	19	6	per 100 lb.
	(Prices free on trucks, Cape Town)				
Jas. Searight & Co., Cape Town.	No. 1 Superphosphates .. (containing 12·14 per cent. Phosphoric Acid soluble in water, being equal to 26·30 per cent. Tribasic Phosphate of Lime). ..	£5	0	0	per ton of 2,000 lb.
Jas. Searight & Co., Cape Town.	No. 2 Superphosphates .. (containing 14·16 per cent. Phosphoric Acid soluble in water, being equal to 30·35 per cent. Tribasic Phosphate of Lime). ..	5	10	0	
	No. 3 Superphosphates .. (containing 17·18 per cent. Phosphoric Acid soluble in water, being equal to 37·39 per cent. Tribasic Phosphate of Lime). ..	£6	0	0	per ton of 2,000 lb.
	Vine Fertilizers	9	0	0	

A reduction of 5s. per 2,000 lbs. is allowed on orders of 100 bags or more. Special rates can be arranged if delivery is taken ex importing steamer, the goods being trucked at Docks.

Woodhead, Plant & Co. **Cape Town.**	**Thomas' Phosphate Powder**	**£4**	**15**	**0**	**per ton of 2,000 lb.**
	Superphosphates	**5**	**15**	**0**	
	Nitrate of Soda	**14**	**0**	**0**	
	Muriate of Potash	**16**	**0**	**0**	
	Sulphate of Potash	**16**	**0**	**0**	
	Wheat Fertilizer	**8**	**10**	**0**	
	Kainit ..	**4**	**15**	**0**	**" "**
	Potato ..	**1**	**15**	**0**	**per 200 lb.**
	Vineyard Manure	**1**	**15**	**0**	**"**
	Tobacco Manure	**1**	**15**	**0**	**"**
	Sulphate of Ammonia	**1**	**2**	**6**	**per 100 lb.**
	Subject to a discount for cash.				

De Waal & Co., **Cape Town.**	**Jadoo Fibre**	**10s. 6d. per bale of 100 lb.**

White Ryan & Co., Cape Town.	Potato, Vegetable and General garden	£8 10s. per ton of 2,000 lb. If less than ½ ton 18s. 9d. per bag of 200 lb.
	Pure Ground Bone ..	£6 10s. per ton of 2,000 lb. If less than ½ ton 18s 6d. per bag of 200 lb.
White, Ryan & Co., Cape Town.	Quick-acting Bone and Potash Mixture	£7 per ton of 2,000 lb. If less than ½ ton 16s. per bag of 200 lb.
	Selected Bone Meal for Cattle, Horses, Pigs and Poultry ..	15s. 6d. per 100 lb.; special price per ton.
	Bone Grit for Fowls ..	12s. 6d. per 100 lb.
	Superphosphates ..	Wholesale only.
Malcomess & Co., E. London.	"Malcomess" A. Fertilizer, for Potatoes, Mealies, Vegetables, Orange and other trees ..	£9 per ton of 2,000 lb.
	"Malcomess" B. Fertilizer, for cereals, especially wheat ..	£9 per ton of 2,000 lb.
	Accompanied by guaranteed analysis by Prof. Hahn ..	(less 5 per cent for cash).
James Flower & Sons, Cape Town.	"H.B.T." Gypsum	£8 10s. per ton of 2,000 lb.
	Pure Ground Bone Meal ..	£8 10s. „ „ (in bags f.o. trucks—Cape Town).
Government Guano :—	Ordinary Guano	£6 10s. per ton of 2,000 lb, or 13s. per bag of 200 lb.
	Rock Guano	£6 17s. per ton of 2,000 lb. or 13s. 9d. per bag of 200 lb.

For use within limits of Colony.

Price includes delivery at Cape Town Railway Station.

D. E. Hockly & Co., East London.	"Hockly's Special Fertilizer." A complete manure for all crops	£9 per ton of 2,000 lb. less 5 per cent for cash.
	Pure Bone Meal	Special Price.
J. G. Steytler & Co., Cape Town.	Phosphates or Basic Slag	£4 2 6 per ton of 10 bags each 200 lb.
	Superphosphates ..	4 12 6 „
	Dissolved Bone ..	6 7 6 „
	Grain Fertilizer ..	7 0 0 „
	Potato Fertilizer ..	8 0 0 „
	Vine Fertilizer ..	8 0 0 „

The Feather Market.

CAPE TOWN PRODUCE.

Messrs. Wm. Spilhaus and Co. report under Saturday's date, June 14, as follows:—

Ostrich Feathers.—On to-day's sale only a small quantity was submitted, and in sympathy with London prices suffered a decline of 10 per cent., most marked in boos, blacks and drabs. Business for the day, 416 lb., which sold at £960 2s. 6d.

	£	s.	d.	£	s.	d.
Whites (primes)	10	10	0	14	0	0
Firsts	7	10	0	10	0	0
Seconds	5	10	0	6	10	0
Thirds	4	0	0	4	10	0
Inferior and stalky	1	15	0	2	5	0
Byocks	4	10	0	6	0	0
Feminas (super)	6	0	0	8	0	0
Firsts	4	10	0	5	10	0
Seconds	3	0	0	4	0	0
Thirds	2	0	0	2	10	0
Inferior	0	15	0	1	0	0
Dark	3	10	0	5	0	0
Spadonas (White)	1	10	0	2	0	0
Light and Dark	0	10	0	1	0	0
Boos (White)	1	0	0	1	5	0
Light	0	17	6	1	2	6
Black Butts	0	7	6	0	10	0
Dark	0	7	6	0	10	0
Inferior	0	3	0	0	5	0
Blacks (Long)	4	0	0	4	10	0
Long Medium	2	0	0	3	0	0
Medium	1	0	0	1	10	0
Short	0	5	0	0	10	0
Long Floss	1	5	0	1	10	0
Medium Floss	0	7	6	0	10	0
Short Floss	0	2	6	0	5	0
Drabs (Long)	2	0	0	3	0	0
Long Medium	1	5	0	1	10	0
Medium	0	10	0	1	0	0
Short	0	2	0	0	4	0
Long Floss	1	5	0	1	10	0
Medium	0	5	0	0	10	0
Short	0	2	0	0	3	0
Inferior Long Blacks and Drabs	0	15	0	1	0	0
Floss	0	4	0	0	5	0
Wiry	0	0	6	0	0	6
Chicks	0	0	6	0	1	0

GOVERNMENT NOTICES.

Cape Government Railways.

ADMISSION OF APPRENTICES INTO THE LOCOMOTIVE DEPARTMENT.

There are vacancies for Apprentices in the following Branches of the Locomotive Workshops at Salt River, viz.:—

Boiler Shop	Three boys for heating rivets and cleaning Boilers, to learn the trade of a Boilermaker.
Carriage Shop	Two boys, to learn the trade of a Sawyer.
Carriage Shop	One boy, to learn the trade of a Carriage Fitter.
Carriage Shop	Two boys, to learn the trade of a Coach Builder.
Carriage Shop	Two boys, to learn the trade of a Coach Painter.
Blacksmith Shop	One boy, to work steam hammer;

and applications from youths between the ages of 14 and 16 are invited for filling the vacancies.

Applicants must have passed the 5th Standard, and will be required to produce a certificate to that effect, and also certificates as to character.

Applicants who are able to produce proofs of having satisfactorily passed a higher standard of education will receive the preference in filling the vacancies, other things being equal.

The rate of pay to commence with will be 2d. per hour.

Applications should be sent to the Chief Locomotive Superintendent or Locomotive Superintendent, Salt River, from whom any further particulars can be obtained.

Office of the General Manager of Railways, Cape Town,
8th March, 1902.

T. R. PRICE,
General Manager.

Farmers' Apprentices. Dairy Assistants, &c.

As inquiries are from time to time received from young men from abroad as to where they may serve apprenticeship or gain practical experience of farming in this Colony, before starting on their own account, the Secretary for Agriculture invites Farmers who are willing to receive young men of good character, for this purpose, to register their names with the Under Secretary for Agriculture, stating the class of farming they do, how many young men they are prepared to take, and for what period they would enter into an agreement.

It is not probable that these young men will be in a position to give more than their free services in return for the experience they will gain; that is, they will not be able to pay any fee; and they will look to receiving free board and lodging in return for their services.

It is to Farmers, therefore, who are willing to grant such young men free board and lodging in return for services rendered, that this application is especially addressed.

With reference to the above notice to Farmers, the Secretary for Agriculture now invites young men who are willing to engage themselves as Farmers' Apprentices in Cape Colony to register their names with the Under Secretary for Agriculture, Cape Town. The apprentice will gain experience in farming in South Africa, and have an opportunity for spying out the land before starting on his own farm. To the new comer from another country this is essential, for he has much to learn and unlearn.

Many applications for such Apprentices have been received from Farmers in the Colony. It will be noted that the Apprentice will neither receive wages, nor pay a fee. He will get free board and lodging in return for his services, and at the same time acquire the experience he is in need of.

Applications for employment have also been received from several Lady Dairy Experts and Dairy Assistants; and Dairy Farmers and others desiring to avail themselves of the services of such are invited to register their names with this Department, giving particulars as to situation and extent of operations, etc., and salary and other emoluments they are prepared to offer.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM BASUTOLAND.

By command of His Excellency the Governor the following Proclamation No. 63, 1902, was published in the *Government Gazette* of April 22nd, 1902:—

Under and by virtue of the powers vested in me by the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," and the Act No 2 of 1897, entitled the "Animal Diseases Rinderpest Amendment Act, 1897," I do hereby proclaim, declare and make known that, whereas the disease known as Rinderpest is prevalent amongst cattle in Basutoland, it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced from Basutoland into any part of this Colony, save and except cattle in yoke and accompanied by a certificate, to be obtained and held by the person in charge of such cattle, signed by a competent and responsible officer, to the effect that such cattle are free from infectious or contagious disease and have not been in contact with infected animals or come from a locality where any such disease shall be known to exist.

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM ORANGE RIVER COLONY AND THE TRANSVAAL.

By command of His Excellency the Governor, the following Proclamation No. 139 1901, was published in the Government Gazette of August 16th, 1901:—

Under and by virtue of the powers vested in me by the "Animal Diseases Act," No. 27 of 1893, and by the "Animals Diseases Rinderpest Amendment Act," No. 2 of 1897, I do hereby proclaim, declare and make known that it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced into any part of this Colony from the Orange River Colony and the Transvaal, save and except such cattle as may be required to be introduced by the Government for the purpose of supplying Bile or Serum for inoculation against Rinderpest:

And I do hereby proclaim and make known that all Horned Cattle which may this Colony in contravention of this Proclamation shall be liable to be destroyed

And I do hereby further declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

Proclamation No. 217, bearing date the 29th day of October, 1900, together with the regulations issued thereunder, is thereby repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is observed, and to bring to ustice any person who may contravene the same.

Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined Regulation for checking the spread of the infection is republished.

REGULATION ISSUED UNDER PROCLAMATION No. 30, DATED 20TH JANUARY, 1899.

Whenever under the provisions of Sections 11 and 12 of Act No. 27 of 1893, any area is declared or proclaimed to be an area infected with Rinderpest, it shall not be awful for any person, animal, animal produce, article or thing, who or which may, in e opinion of the Magistrate of the District in which such area is situated, be liable onvey infection of Rinderpest, to leave or to be removed therefrom.

Inoculation Against Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of the Colony, it is desirable to inform stock-owners of the intentions of the Government as to dealing with the outbreak should it unfortunately become general in the Colony, and to advise stock-owners as to the best course to follow.

The Government propose that, as a general rule, cattle-owners themselves should perform the inoculation. Glycerinated Bile will be used, though circumstances may arise where it will be preferable to use Serum.

Bile Stations will be established in suitable places as necessity arises in localities where farmers have agreed to contribute the required proportion, say 5 per cent., of their cattle for production of the bile. It must be clearly understood that unless farmers are prepared to thus contribute the necessary cattle, it will be impossible for them to have the benefit of a Bile Station.

Glycerinated Bile will be issued free to contributors in proportion to the number of cattle contributed to a Bile Station. To non-contributors a fair charge will be made for bile if any be available for issue.

Serum will be charged for at the rate of £1 per bottle of ten doses.

A limited supply of Glycerinated Bile to meet emergencies will, for a time, be available, free of charge, from the Bile Station which has been established under arrangements with the Imperial Military authorities near Aliwal North.

As occasion requires, Demonstrators will be sent to instruct farmers in the method of inoculation, free of charge. They will, as a rule, inoculate only enough cattle to show how it is to be done, leaving the owner to continue the work. The Government will supply syringes on application to the Resident Magistrate, or to the Demonstrators at the following charges:—20 cc. capacity, 20s; 10 cc. capacity, 15s. This payment may be recovered on return of the syringe to the Magistrate, in good order.

After the experience gained during the outbreak of 1896-1898, the Colonial Veterinary Surgeon wrote* as follows:—

"The method of inoculation which I would recommend in future sporadic outbreaks of the disease is briefly as follows:—

" *Infected Herds.*—These should be inoculated at once with either serum or glyceri-
"nated bile; every animal which indicates infection by a rise of temperature should
' receive a large dose of not less than 100 cc. of serum, or 80 cc. of glycerinated bile;
" the latter should, by preference, be injected into the jugular vein, so as to secure its
" immediate action. Then from eight to twelve days after, all the animals in the herd
" which give no indication of being infected with the disease, or fever temperature
" should receive an injection of pure bile; not less than 10 cc., and for large animals
" 20 cc. This will confer a lasting immunity sufficient for all practical purposes.

" *Clean Herds.*—When it is decided to inoculate a clean herd, which is in danger of
" becoming infected through its proximity to diseased cattle I would recommend that
" the animals composing the herd should be inoculated first with 20 cc. of glycerinated
" bile, and to follow this inoculation in from eight to twelve days with an injection of
" from 10 to 20 cc. of pure bile. This will confer a strong and lasting immunity on the
" animals in the herd, and will be free from risk arising from the inoculation or of
" introducing the disease.

" *Use of Pure Bile.*—Pure fresh bile should not be used in an infected herd, if any
" of the other inoculating materials can be obtained, as it tends to intensify the
" character of the disease in those already infected, and its immunising effect is too
" slowly developed to protect the healthy cattle against infection, if they are left in
" contact with those already sick. If no other means are available, however, the
" temperatures of the whole of the cattle in the infected herd should be carefully taken
" by the clinical thermometer, and only those which register a normal temperature
" should be inoculated with pure bile, the others should be separated from the inoculated
" lot at once, and carefully tended. If glycerine can be obtained, the spare bile should
" be mixed with it in the proper proportions—one part of glycerine to two parts of
" bile. This mixture, after standing forty-eight hours, may be injected into the affected
" animals in large doses, not only with safety, but with marked benefit.

" *Preparing the Bile.*—The bile should be taken from an affected animal immedi-
" ately after death, or from one which is killed in the last stage of collapse.

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* See *Agricultural Journal*, June 8, 1899, in which will be found a full consideration of different methods of inoculation.

"Biles of all shades of colour—except those which are red from the presence of blood—may be used, so long as they are clear and free from a putrid smell. Thin light yellow biles should also be rejected.

"All the galls extracted at one time should be mixed together, after standing separately for twelve to eighteen hours, so as to render them uniform in strength and immunising properties. Pure bile should be used on the second day after being drawn, unless it is kept in an ice chest, when it may be kept sweet much longer. But if pure bile is used as a second inoculation only, as above directed, it is not desirable to keep it longer than twenty-four hours.

"Glycerinated bile is made by adding one part of glycerine to two parts of bile, stir the mixture well, then mix all the biles taken at one time, and allow them to stand for eight days. But if there is urgency, the glycerinated bile may be used forty-eight hours after it is mixed.

"I would strongly recommend that in every outbreak of the disease that occurs, every drop of suitable bile, obtained from the animals which die, should be mixed with glycerine in proper proportions, two parts of the bile to one of glycerine, so that it may be preserved and made available for the inoculation of infected herds, and also for the first inoculation of clean herds which may be considered in danger. Pure bile for the second inoculation of clean herds can always be obtained when the disease appears in any locality, which would be the only reason for inoculating clean herds in the immediate vicinity."

Taking the Bile.—To remove the bile the animal must be laid on its left side, the skin and flesh on the right side immediately behind the last rib being cut through; the ribs being raised, the gall bladder will become visible. The gall bladder should be then punctured with a small knife and the gall allowed to escape into a wide-mouthed bottle. If wide-mouthed bottles are not available then ordinary whisky bottles may be used with an *enamelled* funnel, which can be procured at any country store. Every precaution must be taken that the operation is performed in a thoroughly clean manner, the hands of the operator and all knives, &c., being thoroughly cleansed before use.

Inoculating.—After having secured the animal to be operated upon, the necessary dose of bile is injected under the skin of the dewlap by means of a Hypodermic Syringe, care being taken that the point of the needle is not inserted into the flesh, but between the skin and flesh.

Symptoms of Rinderpest.

The Outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined description of the symptoms of Rinderpest is hereby published:—

The early symptoms of Rinderpest are a rise of internal temperature to 106 or 107° Fahr.; the animal stands with its head hanging down, ears drawn back and coat staring; it refuses all food and occasionally shivers. A mucous discharge flows from the eyes and nostrils; the extremities are cold, and the breathing is laboured and frequently accompanied with moaning. The inner part of the upper lip and roof of the mouth and all visible mucous membranes are reddened, and covered with an eruption of minute pimples, and later with a branlike exudation. The bowels are occasionally constipated, but in most cases diarrhœa sets in, the evacuations being slimy and very frequently of a dirty yellow colour. The prostration of strength is great, the animal staggering when made to move. In milch cows the secretion of milk is rapidly diminished, and soon ceases altogether. The disease usually ends fatally in from six to ten days.

It is generally believed that the infection is produced through the respiratory organs; from there the contagion becomes generalised. The contagion exists in the secretions and excretions, urine, saliva, mucous secretions of the nose, mouth and eyes, in the sweat, expired air, blood, and in all the tissues. It may be conveyed directly by the diseased animals, or indirectly by the dung, the bedding, the earth, hides, wool, meat, clothing, wagons or vessels, by people, dogs, sheep and chickens, &c. Contagion takes place only through short distances. When the weather is dry this is reduced to its minimum (about 27 yards), and the progress of the disease may be stopped by a ditch separating the diseased from the healthy animals.

In order to detect the earliest symptoms of Rinderpest, owners of horned cattle are warned of the urgent necessity for keeping a constant and close watch upon their stock. Any suspicious cases should be immediately reported to the nearest Resident Magistrate,

Field-cornet or Police Officer, and the sick animal kept separate till an inspection is made. Stock should be carefully examined daily by a responsible person, more particularly for any symptoms resembling those above described.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October, 1900:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(*a*) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(*b*) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie, Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time introduction; and upon receipt of such notice the Inspector shall proceed at the and to the place specified in such notice, or as soon thereafter as may be possible, and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with an Cattle affected with Lung-sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz.:—

Number and general description of Cattle } ....
....
....
Owner's name and address } ....
....
In charge of..
Place to which Cattle are being sent..................................
(Signature)..
(Address)..
Date..............

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature..
Address)..
Date......................

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general description of Cattle } ....
....
....
Owner's name and address } ....
....
In charge of..
Place to which Cattle are being sent..................................
(Inspector's signature)..
(Address)..
Date....................

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

Destruction of Wild Carnivora.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

	s.	d.
For a Lynx or Red Cat (*Felis caracal*)	3	6
For a Red Jackal (*Canis mesomelas*)	5	0
For a Silver or Side-striped Jackal (*Canis adustus*) ..	5	0
For a Maanhaar Jackal (*Proteles cristatus*)	3	0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1	0
For a Baboon (*Papio porcarius*)	1	3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

(*a*) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.

(*b*) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Netting for Fruit Trees.

The Board of Horticulture, Western Province, has decided to again import, in time for next fruit season, a supply of Bird and Fly Netting. The Bird Netting will, like last year, be made to order in pieces of about 130 feet long and 13 feet wide, and its cost will be about 15s. per piece. The Fly Netting will be mosquito netting of the same kind as has been imported on previous occasions. The cost will probably be the same as before, from 7s. to 8s. per piece 120 feet long by 70 inches wide.

Applications should be addressed to the Secretary, Board of Horticulture, Stellenbosch. All applications must be in the hands of the Secretary not later than the 31st July. On arrival of the nettings, applicants will be notified of the amounts respectively due, and on receipt of remittance the nettings will be forwarded.

C. Mayer, Secretary.

Western Province Board of Horticulture,
Stellenbosch, 9th June, 1902.

Salt Bush Seed.

[illegible] of Agriculture has now received a limited quantity of Salt Bush Seed, which will be disposed of at the rate of 4d. per lb. exclusive of raila
Applications should be addressed to the Under Secretary for Agriculture.

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, 14th June, 1902, as telegraphed by the Civil Commissioners of the places respectively named, is published hereunder.

CENTRE.	A Wheat per 100 lb.	B. Wheat Flour per 100 lb.	C. Boer Meal per 100 lb.	D. Mealies, per 100 lb.	E Mealie Meal per 100 lb.	F. Barley per 100 lb.	G. Oats per 100 lb.	H. Oat-hay per 100 lb.	J. Potatoes per bag	K. Tobacco (Boer Roll.) per lb.	L. Beef per lb.	M Mutton per lb.	N. Fresh Butter per lb.	O. Eggs per doz.	P. Cattle (Slaughter)	Q. Sheep (Slaughter)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s d	£ s. d.
Aliwal North ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Beaufort West ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bredasdorp ...	0 9 6	...	...	0 12 0	...	...	...	...	0 10 0	0 2 0	0 0 7½	0 0 8	0 1 9	0 3 6	...	...
Cape Town ...	0 10 0	0 12 6	0 11 0	0 9 0	0 9 6	0 9 0	0 11 0	0 10 0	1 3 0	0 0 6	0 0 7	0 0 8½	0 1 4	0 2 6	17 0 0	1 4 0
Clanwilliam ...	...	1 15 0	2 2 0	0 15 6	...	...	...	...	1 5 0	0 1 4	0 0 7	0 0 7	0 2 0	0 2 0	...	15/- to 20/-
Colesberg ...	0 10 0	...	...	...	...	...	...	...	0 9 0	...	...	...	0 1 3	0 2 6	...	...
Cradock ...	...	...	...	1 7 0	...	0 18 0	...	...	...	...	0 0 8	0 0 8	0 1 9	0 4 0	...	...
Dordrecht ...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...
East London ...	0 11 6	0 17 0	0 11 6	0 19 9	0 10 0	0 15 9	0 18 3	0 12 9	1 1 0	0 1 6	0 1 0	0 1 0	0 2 9	0 2 0	..	...
Graaff-Reinet ...	0 11 6	...	0 13 6	0 12 0	...	0 11 0	0 11 6	..	0 15 0	0 0 5½	0 0 7	0 0 7	0 2 0	...	£11 10 to £13 10/-	19/- to 21/6
Graham's Town ...	...	...	..	0 14 9	...	0 8 4	...	0 7 6	0 18 6	0 1 3	0 0 8	0 0 9	0 2 2½	0 3 4½	...	...
Kimberley ...	0 13 6	0 17 0	0 13 6	0 12 6	0 12 6	0 12 6	0 15 0	0 15 0	1 5 0	0 1 0	0 1 2	0 0 10	0 2 6	0 3 0	£14 to £20	20/- to 25/-
King Wm's Town	0 10 3	0 16 3	0 12 3	0 11 0	0 10 6	0 11 0	0 13 0	0 9 0	0 13 6	0 1 0	0 0 7	0 0 8	0 2 3	0 1 9	£16 to £25 10/-	21/- to 30/9
Malmesbury ...	0 10 0	0 13 0	0 12 6	0 10 6	...	0 9 0	0 8 6	0 9 0	0 18 6	0 1 6	0 0 8	0 0 8	0 1 9	0 2 0	20 0 0	1 4 6

CURRENT RATES OF AGRICULTURAL PRODUCE—(*continued*).

CENTRE.	A. Wheat per 100 lb.	B. Wheat Flour per 100 lb.	C. Boer Meal. per 100 lb.	D. Mealies. per 100 lb.	E. Mealie Meal. per 100 lb.	F. Barley per 100 lb.	G. Oats per 100 lb.	H. Oat-hay per 100 lb.	J Potatoes per bag	K. Tobacco (Boer Roll.) per lb.	L. Beef per lb.	M. Mutton per lb.	N. Fresh Butter per lb.	O Eggs per doz.	P Cattle (Slaughter)	Q. Sheep (Slaughter)
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d
Mossel Bay ...	0 18 0	0 14 0	0 12 0	0 9 0	...	0 7 6	0 16 0	0 7 6	0 15 0	0 1 0	0 0 9	0 0 9	0 1 6	0 1 6	...	...
Pietermaritzburg Natal	..	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...
Port Alfred ...	...	...	...	1 8 0	...	...	...	...	1 2 0	...	...	...	0 1 9	0 2 0	...	..
Port Elizabeth ...	0 10 0	...	...	0 10 6	...	0 6 0	...	0 6 6	1 1 0	0 0 7	...	...	0 2 0	0 3 3	..	..
Queen's Town ...	0 10 0	0 15 9	0 10 3	0 9 0	0 4 6	0 9 6	0 7 6	0 6 0	0 5 0	0 2 6	0 0 8	0 0 7	0 1 9	0 3 0	...	...
Tarkastad ...	0 10 6	1 1 0	0 12 6	0 10 0	0 10 0	0 9 0	...	0 5 0	0 10 0	0 2 0	0 0 8	0 0 7	0 1 9	0 3 0	...	...
Vryburg ...	0 16 0	1 1 0	0 17 6	0 15 0	0 15 0	...	0 13 0	1 1 0	1 6 0	0 1 6	0 0 10	0 0 10	0 2 6	0 4 0	...	...
Worcester ...	0 11 6	0 15 0	0 12 0	0 10 0	0 10 9	0 9 0	0 12 0	0 8 0	0 16 0	0 0 9	0 0 8	0 0 8	0 1 9	0 2 0	12 0 0	1 4 0

NOTE.—Returns have no been received from the Civil Commissioners of Aliwal North, Beaufort West and Dordrecht,